

# FlashFlood NEWS

2020 Issue 1

Summer 2020

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## 15th Annual Fall Floodplain Institute (FFI) Returns to Asheville

The NCAFP fall conference is scheduled during the peak fall season on October 20-23 at the Crowne Plaza Resort in Asheville. The Crowne Plaza is just minutes from downtown Asheville and the resort offers tennis, golf, fitness center, a restaurant and lounge facilities. In addition, a treetop adventure park, zipline canopy tours and a mountain bike park are located adjacent to the property. The beauty of the fall colors in October will provide a spectacular backdrop for our conference.

Cancellation of the annual spring conference earlier this year will bring a few changes to the normal format which should make it one of the biggest and best fall conferences ever. The program is expanded from two full days of presentations, to two and one-half days, which is typical at the spring conference. We will have multiple tracks with presentations, workshops, field trips, and CFM refresher/exam. Presentations will include a wide range of topics and corresponding continuing education credits for engineers, floodplain managers, planners, and other professionals. We are looking for presenters so please consider submitting an abstract for your project. We will also honor our three (3) Scholarship recipients. The annual membership luncheon meeting will also be held to facilitate board member elections and other association related business.



One of the most significant offerings of this fall's conference is the availability of valuable networking time to reacquaint with old friends and colleagues or meet new ones. We will have more opportunities for exhibitors and vendors to showcase their booths. This year's fall conference is relevant for all levels of experience in the variety of professions related to floodplain management.

Save the dates – October 20-23, 2020 – and plan on attending!

## Thank you to our FlashFlood News sponsors!

The NCAFP Board recognizes that COVID-19 has had a tremendous impact not only on our members but also on our corporate sponsors. As a way to show support to our sponsors, we have decided to include the advertisements from the last two editions of Flashflood at no charge to our sponsors. As you view the newsletter, remember the role that the sponsors play in supporting our organization.

# From the Chairman's Desk



AMIT SACHAN, PE, CFM  
NCAFFM CHAIRMAN

## From the Chairman's Desk

### My Floodplain Manager friends,

The last few months were especially tough for our organization. We lost John Fullerton who was a strong pillar to our organization. For several people including myself, John was a guide, mentor, and a dear friend. A true gentleman, John always met you with a genial smile that made you feel welcome. John touched countless lives and made a tremendous contribution to our organization. I feel fortunate to have known him and to have shared some good times with him. Everything that he did will always remain with us and I am sure that he will always be watching over us. **You'll always be missed, John!**

Over the last few months, we were confined within our houses fighting with the invisible enemy. Coronavirus disrupted our way of living but the choice is still with us to stay positive and keep looking at the best things in life. **Let's choose hope, even if it is the toughest thing to do.** While being out of school is a lost time of education and social contact for the kids, spending time as a family is a blessing. If not for the lockdown, we wouldn't have noticed the beauty in small things like bird nests in our back yard, painting with the kids, or camping in the backyard. But what I miss most is seeing my friends, colleagues, and clients and I can't wait to see you all in-person at our **Fall Institute in beautiful mountains of Asheville.**

As you all know, we had to cancel our Spring conference at Atlantic Beach due to the Coronavirus pandemic. Fortunately, we were able to provide virtual workshops to make up for the lost educational opportunity but it has been challenging to provide similar opportunities to connect with our peers and friends. We look forward to having a much bigger Fall institute gathering. The Fall Institute will kick-off with the **'John Fullerton Memorial Golf Tournament'** as a solemn tribute to a great person. We are also gearing up to the national ASFPM Conference in Raleigh between May 9-13, 2021, with an apt theme **'Floodplain Management from Appalachia to the Atlantic.'** We are excited about the national conference in 2021 and hope most of you will be able to join us.

We have several exciting initiatives including a scholarship program, flood model outreach, webinar series, and virtual workshop sessions. I am sure that they will provide **educational and networking opportunities to our membership.** I can't be more excited about the direction that we are headed in due to the tireless work of our board members.

We have now officially entered hurricane season and hope that Mother Nature will not be too harsh on us this time of year as well. Regardless, our emergency officials and responders are prepared for the worst and they are equipped with the sound policies and planning tools that floodplain managers like you developed over the years.

Last but not the least, I want to express my **gratitude to the NCAFFM board and membership** for giving me an opportunity to serve this great organization. It has been a wonderful experience and I will always treasure the time I spent working with and learning from all of the board members. I would strongly encourage everyone to make use of the opportunity to serve on our Board. I am sure that you will find it rewarding at so many levels and most importantly will make friends for life.

Have a safe and enjoyable summer with your families and loved ones and we hope to see you in Asheville!



# ASFPM Foundation - Expanding discussions on flood policy across the nation & the world

**Amit Sachan, PE, CFM**

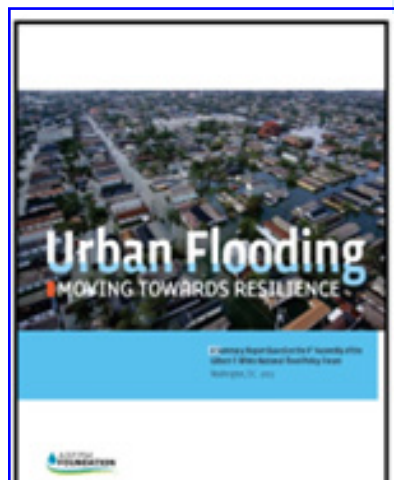
The ASFPM Foundation supports education and policy initiatives along with several programs to promote sound flood risk management. The Foundation raises funds through donations by our members and corporate partners. 2019 was a busy year for the foundation. Some of the activities and initiatives are as follows:



## **Workshops:**

### **The ASFPM Foundation convened the 6th Gilbert F. White National Flood Policy Forum – Increasing Our Resiliency at the George Washington University in Washington, DC.**

More than 100 invited experts representing federal, state, and local agencies, the private sector, academia, and other stakeholder groups met for two days to explore opportunities, barriers, and challenges, and focus on the policy as related to urban flooding. To catalyze attention and action, ASFPM Foundation published “Urban Flooding: Moving Towards Resilience. A Summary Report based on the 6th Assembly of the Gilbert F. White National Flood Policy Forum.” The report is on the ASFPM Foundation website.



## **Scholarships:**

In addition to financial support for the cost of attending college, the **Future**

**Leaders Scholarship** provides a variety of experiences to inspire and prepare the recipient to pursue a career in floodplain management. Jesus Mulgado, our first Future Leaders Scholar, earned his bachelor’s degree in May 2019, becoming the first in his family to graduate from college. He also passed the Fundamentals of Engineering exam.

The Foundation hosted the **9th Annual Student Paper Competition** at the 2019 ASFPM Annual National Conference in Cleveland, Ohio in May 2019. Since 2011, the Foundation has sponsored a student paper competition as a way to engage the next generation in the important conversations pertaining to our profession.

Three finalists are invited to present their papers at the conference where they will also have to opportunity to learn about a wide range of topics relevant to their future career.



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## **Resources for Floodplain Managers:**

In 2013, the ASFPM Board of Directors approved the development of seven (7) **No Adverse Impact (NAI) “How to Guides.”** This initiative was a direct result of feedback from ASFPM members who used the NAI Toolkit which provided examples of NAI techniques but did not go into detail about how these strategies could be implemented in a “real world” setting. ASFPM Foundation provided funding for the development of these How to Guides. The last guide in this series, How to Guide on Emergency Services, was completed in 2019 and is on the ASFPM website.

The NCAFPM continues to support the ASFPM Foundation and contributed \$1,000 this year towards this great cause. We encourage our membership to contribute and support activities related to floodplain management education and initiatives.



## **Tribute to John Fullerton, April 28, 1944 - April 23, 2020**

**By Susan Frady**

The North Carolina Association of Floodplain Managers lost our most dedicated member, mentor, and friend and the world lost a bright and shining star. John Fullerton went to be with his Lord on April 23, 2020 after a second battle with cancer.

Cynthia Fox Clark, another former NCAFPM Chairperson, said it best when she heard about Johns passing, “I have been singing Sweet Caroline in my head all day today. And thinking about Sambuca, golfing and golfing buddies (choosing the man with one arm to be your partner,) being elegant when asked how you are, loving some lobster rolls, loving someone so true as he loves Jane, being able to feel the depth that he feels and being ok with being tearful when the occasion calls for it, loving the Lord, being such a skillful public speaker- and just being kind to people in all walks of life. What a man.”

Early in his career, John was a volunteer fireman for over twenty years, the Executive Director of the Chamber of Commerce in Camden, Maine, and he spent time working in the hospitality industry. He eventually ended up in Wilmington, North Carolina as a Zoning Administrator where he became involved with NCAFPM. John quickly put his skills to work and became one of our “Greats.” He was the NCAFPM Board Chairman from 2012 – 2014 where his talents became obvious as an event organizer. So much so that when he stepped aside as Chairman the board had the forethought to offer him the position as Conference Chair. He readily took the lead to plan and organize our



Spring and Fall conferences. John even left us a blueprint for the upcoming conferences to help guide us as we move forward. No one could have foreseen the effect that COVID-19 would have on us as an organization and the cancellation of the Spring Conference kind of felt fitting after we lost John.

John never felt sorry for himself, only for those who would be left behind. Until the very end, John was sure to offer encouragement to anyone that he met. The day before he passed, John made it a point to call me just to tell me that he loved me and wanted to make sure I was alright. He spent time that evening on the phone with my husband and they had a great talk. Never did either of us dream that it would be our last conversation with John. One of the things I admired most about John was that no matter where you went with him, he always introduced himself and asked the name of everyone he met. He truly formed a bond with everyone from a cashier at Walmart, or a waitress, to the president of different organizations he dealt with. With John everyone mattered. I can still hear him say when asked how he was doing it was always the same “simply elegant.” John always thanked every Veteran that he ran into for their service to our country. In talking with many of the members of NCAFPM about John, their first thought is John was the first person I met when I came to a conference. John immediately made everyone feel welcome.

In my time with John I came to respect him like no other person I have ever known. John had a simple philosophy that he lived by:

**1. Be humble.**

No matter the source, we can always learn something from someone else's point of view.

**2. Provide value in all you do.**

Have congruence and honesty and always put ourselves in another's shoes.

**3. Take time to learn something about everyone you meet.**

Taking time to share our stories and to listen to each other's stories helps us to relate to each other in a more meaningful way.

John had one true love in his life that went beyond everything else, and that was



his wife Jane. I have never seen anyone who was more a part of each other than they were. They both felt each other's pain and happiness in all things, and I know Jane misses him dearly. To leave Jane behind as he went to be with his Lord was truly one of the hardest things he had ever done. I find comfort knowing that John is still alive in our hearts and his spirit will be watching over us all until we reach our final destination.

**WE LOVE YOU AND MISS YOU JOHN!**



The City's watershed master plan offers a leading example of how a community can harness its determination and resources to protect residents and property.

Why consider a citywide watershed study plan?

The City of Fayetteville has had a [Stormwater Program](#) in place since 1995. And for most of the past decade, the City has been working on capital projects to improve drainage infrastructure in problem areas across the city. But the frequency and intensity of rainfall events, combined with record residential and business growth and expansion, convinced City leaders and staff that their current methods needed to be reevaluated. Efforts accelerated with the passage of the fiscal year 2019 budget.

Working with engineering consulting firm Freese and Nichols, the City is using a high-level hydrologic and hydraulic, 2-dimensional dynamic model of the area to identify and prioritize studies spanning the City's 15 watersheds over the next five years. The studies will help pinpoint locations vulnerable to public safety hazards, property damage and other risks, identify stormwater projects that can provide solutions, and prioritize them for design and construction.

This comprehensive approach aims to improve conditions across the city as well as stimulate economic development and save taxpayer money in the long run.

What improvements and efficiencies can be achieved?

Hydrologic and hydraulic modeling and watershed studies of the primary systems (such as significant creeks, streams and conveyance pathways) are being conducted using traditional 1-dimensional *HEC-RAS* modeling. Modeling and studies of the secondary systems (subsurface drainage infrastructure and headwater conveyance systems) are being conducted in InfoWorks ICM (Integrated Catchment Modeling,) a powerful software that can bring together different kinds of asset types within the same system and easily accommodate updates. The system allows for mapping bridges, pipes, pumps and other 1-D infrastructure elements while incorporating overland flows and channeling models.

Fayetteville is one of the first municipalities in North Carolina to adopt ICM with a vision to create a comprehensive, citywide model. Deciding to go this route took foresight and a willingness to invest in a system that will serve the City into the future and make incorporating new information easier.

Another key part of the project involves creating a new stormwater geodatabase that connects separate data systems more effectively to assist with long-term planning and system performance evaluation. Existing information stored in shapefile and Excel format is being assimilated and translated into GIS-ready format to provide a framework for the uniform formatting and storage of the available spatial data relevant to stormwater planning and management activities within the City of Fayetteville.

The current stormwater infrastructure database architecture will be substantially augmented. Pipe, culvert, dam and inlet data will be identified, gathered, assessed and stored in a new geodatabase for easy access and use. Data stored in CityWorks (a software the City uses for processing works orders) will be incorporated into the geodatabase to provide a sophisticated new way for the

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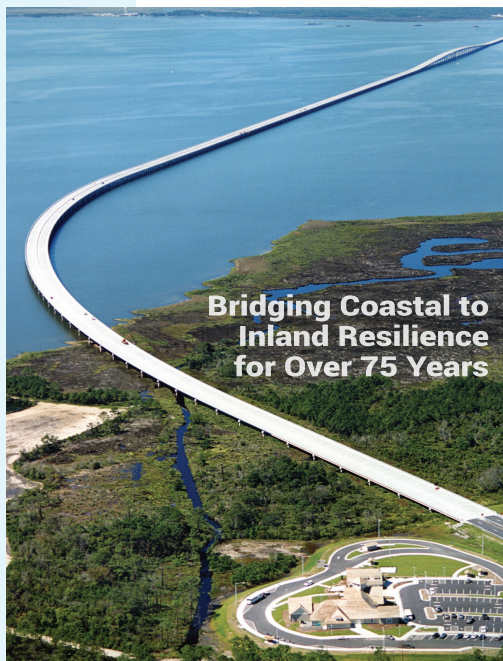
City to address their infrastructure problems.

The goal is to create a system in the near future that allows for this scenario: When a stormwater pipe breaks, crews will not only be able to locate it for repairs but will also be able to identify what type of pipe was used, when it was installed and when it was expected to be replaced. This will help reveal trends and identify important details, including possible causes for the pipe's failure, whether others in the area are also failing and what the best response is to prevent a recurrence.

How can a watershed master plan help build for the future?

- It identifies locations where flooding is most likely to occur and pose hazards for people and property.
- It creates an opportunity to update data by having crews in the field collecting a wide range of information about assets citywide.
- It allows public officials to identify areas of concern and determine the highest-priority stormwater projects for a community.
- It helps outline other actions needed in addition to infrastructure projects, such as warning systems at hazardous locations and invaluable background information for future grant applications and Community Rating System (CRS) updates.
- It supports long-range goals by providing the framework to prepare for additional growth and development.

With a growing population that now tops 209,000, Fayetteville is revitalizing areas across the City. For instance, retail, hotel and dining developments are refashioning downtown around the new minor-league baseball stadium that opened in 2019. Creating a comprehensive, forward-thinking and ambitious citywide watershed master plan to protect those investments — as well as people, property and other assets — is crucial to preparing for the City's future.



## RESILIENCE SERVICES

- Coastal/Beach Restoration
- Environmental Compliance
- Estuarine/Wetland Restoration
- Floodplain Management
- Green Infrastructure
- Hazard Mitigation Planning
- Infrastructure Vulnerability
- Living Shorelines
- Operation and Management Plans
- Ports
- Recovery Planning
- Resilience Strategies
- Risk Mapping
- Shoreline Stabilization
- Stormwater Management
- Stream Stabilization
- Transportation
- Urban and Waterfront Planning
- Vulnerability Assessment
- Watershed Restoration

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## Flood gate at I-95 opening and CSX Railroad underpass in City of Lumberton

The Lumber River is the lifeline to the City of Lumberton – flowing with rich history and providing recreational and economic opportunities. As beautiful as it is, severe weather events in recent years have allowed the river to demonstrate this power, leading to catastrophic flooding. While a dike (levee,) constructed in 1974 by the Robeson County Drainage District #1, protects much of the City of Lumberton within the floodplain, there is still an opening through this levee. This



**Figure 1. I-95 opening in Lumberton**

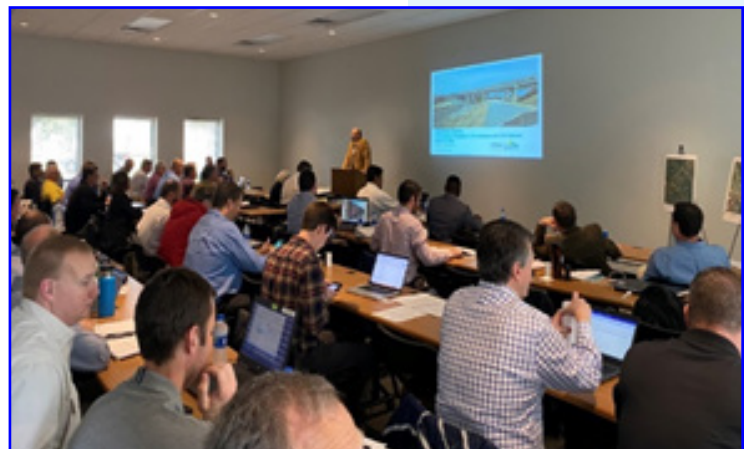
opening, which is under Interstate 95 between exits 17 & 19, is intentional and allows a CSX rail corridor and a local road to traverse under the highway (**Figure 1.**) In recent years, this opening under Interstate highway I-95 has allowed water to pass through during high intensity storms.

Floodwaters from major events, like Hurricane Matthew (2016) and Hurricane Florence (2018)

severely impacted local residents and businesses (**Figure 2.**) During a recent storm event (Hurricane Dorian,) the City installed temporary barriers to stop water from getting through this opening, but Lumber River floodwater did not get high enough to reach the I-95 opening.

The City of Lumberton is planning to install flood gates across this levee opening, which would involve allowing such gates to be closed over the existing CSX railroad corridor and local road to prevent floodwaters from ‘breaching the levee’ and entering the southern part of City. The City has secured grants from Golden Leaf to perform design of the floodgates. The City has also performed groundwork of coordinating with stakeholders such as:

- Local residents and businesses
- Grant agencies
- Elected officials
- CSX Railroad
- NC Department of Transportation (NCDOT)
- Federal Highway Administration (FHWA)
- US Army Corps of Engineers (USACE)
- NC Emergency Management (NCEM)
- NC Department of Environmental Quality (NCDEQ)
- Federal Emergency Management Agency (FEMA)



**Figure 2. Stakeholder Coordination meeting**

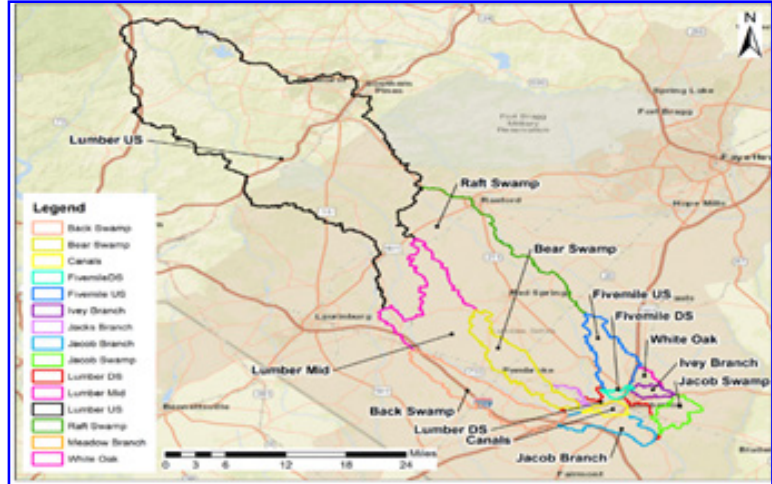
**Written by:**

**Rob Armstrong, PE,  
City of Lumberton**

**Amit Sachan, PE,  
CFM, Atkins**

The City is taking a holistic approach to achieving flood resilience by undertaking other projects around the community. For example:

- Disaster recovery planning
- Canal clearing
- Tanglewood drainage study
- Linkaw Road project
- Godwin Heights study
- Oaks area study
- Airport master plan
- Flood protection system near Carthage Road



Atkins team performed a detailed hydrologic and hydraulic (H&H) study of the Lumber River. Hydrologic analysis was performed using a detailed rainfall runoff HEC-HMS model of the Lumber River basin from the headwaters to the confluence of the

Lumber River and Jacob Swamp (**Figure 3.**) Two-dimensional (2D) hydraulic model was developed along the Lumber River and of its tributaries near the city of Lumberton.



Flood gate will be sized based on H&H study results and input from the key stakeholders such as CSX Railroad, NCDOT, USACE etc. A typical railroad flood gate structure is composed of a concrete monolith and a flood gate. Concrete flood gate monoliths are typically supported on pile foundations. The flood gate could be a swing gate (**Figure 4,**) roller gate or an overhead gate depending on the number of railroad tracks and site restrictions. The structural design of the flood gate will be compliant with the USACE's

**Hurricane and Storm Damage Risk Reduction System Design Guidelines (HSDRRSDG).** The HSDRRSDG requires flood gates to be designed for geotechnical stability and structural resiliency. The minimum width of a railroad gate opening is set by **American Railway Engineering and Maintenance of Way Association (AREMA) Engineering Manual.** A potential challenge when designing a railroad gate is to coordinate with the ongoing railroad operations. Flood gate construction will be done in a way that minimizes the rail stoppage.

The project is currently in conceptual planning phase and final design will follow shortly after. Once constructed, Flood gate along with other flood mitigation projects will go a long way towards making the City of Lumberton a flood resilient community.

# NCAFPM Chapter News

## Celebrate Cynthia Fox-Clark retirement!

One of our own announced her retirement from the Buncombe County Planning Department in January 2020. Cynthia served many roles in her 24 years of service with Buncombe County. Yet it is the one as Floodplain Administrator that we know and cherish her for. She served as Board Chair in 2014-2015, as well as served on the board for many years.



Cynthia graduated from UNC-CH in 1991 with a degree in Sociology and minor in Public Policy Analysis, and earned her master's degree in Public Affairs from UNC-G in 1993. Cynthia's career included service with the Greensboro Housing Authority as a Program Evaluation Analyst, Lake Norman YMCA as the Family Services Coordinator, NCDOT as a Public Transportation Consultant, and numerous roles from capital project management, zoning administration and sustainability planning, during her tenure at Buncombe County. She is a joy to those around her, with her calm demeanor and witty humor. Cynthia's contribution to this organization is invaluable. We wish her well in her new adventures, but still hope our friend and colleague will join us at a future gathering. A few of us joined in a celebration of her service on January 22, 2020.

***The following Sponsors had sponsored the 2020 Spring Annual Conference before it was canceled. The board wishes to extend our appreciation to them for their support.***





## Education and Outreach

### Daniel Tomczak, CFM

The **NCAFPM Scholarship Program** was expanded in 2019-20 through the award of three competitive scholarships to undergraduate college students interested in pursuing a field related to floodplain management (hydrology and storm water, engineering, planning and zoning, coastal management, hazard mitigation, emergency management, surveying, geography/GIS, etc.) The **2020 NCAFPM Berry Williams Scholarships** were named in honor of Berry Williams for his years of service as the State of North Carolina NFIP coordinator and assisting with the establishment and growth early on of NCAFPM. The application process was open to all undergraduate students attending a college or university (including community colleges) within North Carolina.

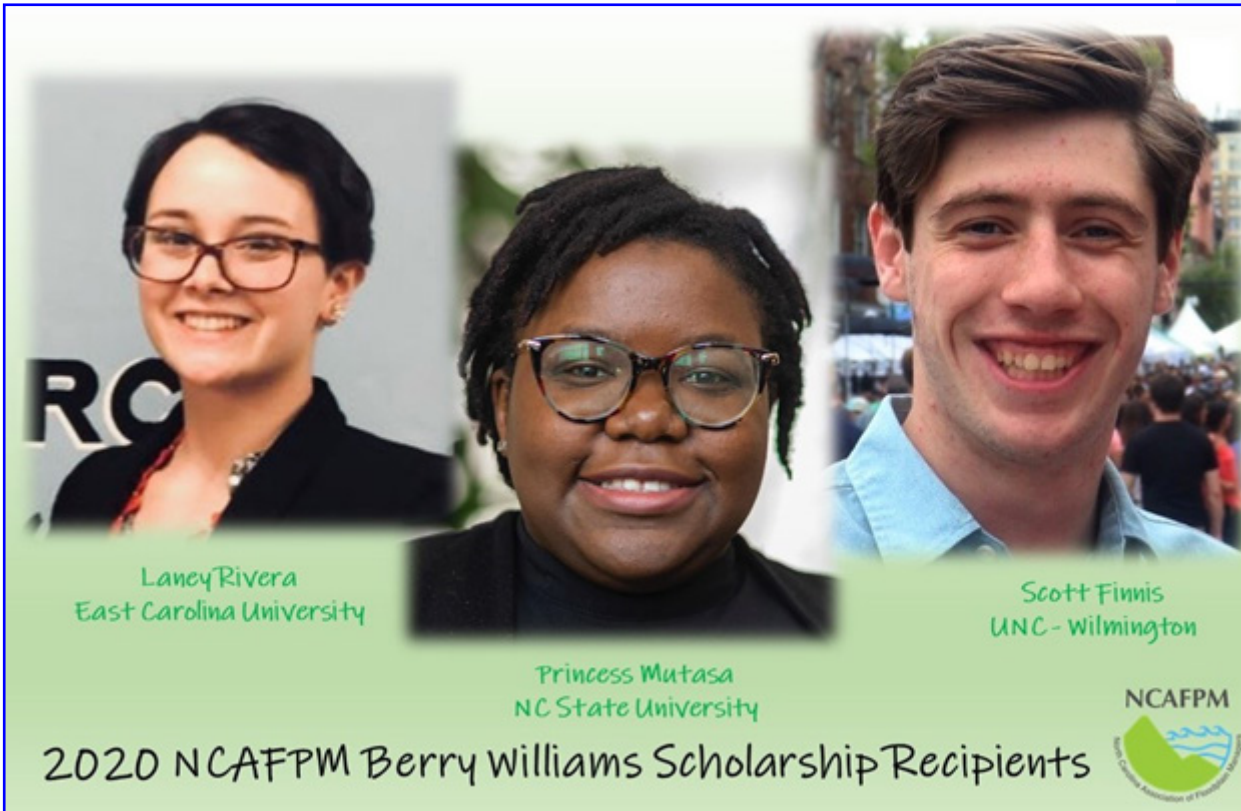
After a competitive applicant review process, Laura Rivera of East Carolina University and Princess Mutasa of NC State University were each awarded a \$1,250 scholarship and Scott Finnis of the UNC-Wilmington was awarded a \$500 scholarship. The recipients were recognized for their achievement through a virtual conference with the NCAFPM Scholarship Committee in April 2020 and will also be recognized at the NCAFPM Fall Floodplain Institute in Asheville in October 2020. A bio for each scholarship recipient is as follows:

**Laney Rivera** is currently in her sophomore year (junior year by credits) at East Carolina University studying Urban and Regional Planning. Ms. Rivera's academic interests include understanding the connection between floodplain management and the livelihood and security of communities, mitigation and resiliency, economic development, and emergency management. She has gained planning and emergency response experiences through working as an intern with the Town of Tarboro as well as volunteering with clean-up crews in Wilmington and other communities after recent hurricanes. In addition, Ms. Rivera is passionate with participating in community service and swing dancing.

**Princess Mutasa** is currently in her senior year at North Carolina State University studying Environmental Technology and Management with a minor in environmental toxicology. Ms. Mutasa's academic interests include urban water resource management, stormwater mitigation, flood mitigation, and environmental justice. She worked on research projects assessing community response to sea level rise in eastern North Carolina, assessing the use of trees for flood mitigation at Lake Johnson (Raleigh), and with the Audubon Naturalist Society as a policy and data intern examining water quality parameters for urban streams in Maryland and D.C. In Ms. Mutasa's spare time she enjoys drawing, painting, kayaking, and travel.

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**Scott Finnis** is currently in his sophomore year at the University of North Carolina-Wilmington studying Coastal Engineering. Mr. Finnis' academic interests include coastal management, coastal ecosystems and sediment management, sustainability, and designing sustainable and eco-friendly coastal structures. Mr. Finnis directly experienced and observed the impacts from Hurricane Sandy that included the damage to homes and businesses, disruption of mobility, and marine ecosystems. He has volunteered for the past seven years with Alliance for a Living Ocean that addresses the protection of marine ecosystems. In addition, Mr. Finnis enjoys surfing, paddle boarding, water polo, and wrestling.



Many thanks need to be extended to the 2019-20 NCAAFPM Scholarship Committee members, including Amit Sachan, Laura Arnold, Scott Brookhart, Amanda Darrow, and Dan Tomczak, for their hard work and time commitment in the planning, promoting, and application review necessary for the scholarship program to continue to grow with success.

In addition to the scholarship program, there are many other outreach opportunities for members to become more involved with NCAAFPM, including Durham Creek Week, High Water Mark sign initiative, North Carolina King Tides Project, NFIP, community workshops, the Catawba River STEM Festival, and others. If you are interested in becoming involved in outreach for NCAAFPM, please feel free to contact me at [Daniel.tomczak@jacobs.com](mailto:Daniel.tomczak@jacobs.com).

## 2020 NCAFPM Spring Annual Conference REPORT

AMIT SACHAN, PE, CFM

### Webinar Series and Virtual Workshops 2020

#### Amit Sachan, PE, CFM, NCAFPM Chair

Promoting public awareness, Floodplain education, and providing opportunities to maintain Certified Floodplain Management (CFM) certification are a few of the key objectives of our association. In order to fulfil these objectives, we host bi-yearly conferences, organize online/in-person trainings, and publish bi-yearly newsletters.

The NCAFPM tries to provide a [Webinar session](#) each quarter. These sessions are generally FREE for the NCAFPM members and they are provided at a nominal cost to non-members. The webinar sessions held this year are as follows and the presentations are posted at the NCAFPM webpage.



Date	Topic	Speakers
March 25, 2020	FIMAN-T: NCDOTs Response Tool for Managing Flood Impacts	Tom Langan, PE, CFM, North Carolina Floodplain Mapping Program Matthew Lauffer PE, CPM North Carolina Department of Transportation David Key, PE, CFM, ESP Associates
January 31, 2019	NFIP and Mapping Updates	Randy Mundt, AICP, CFM, North Carolina Floodplain Mapping Program Dan Brubaker, PE, CFM, National Flood Insurance Program (NFIP) Engineer



### Spring conference 2020 in Atlantic

**Beach** was cancelled due to unprecedented COVID-19 pandemic. The NCAFPM board decided to host 4 [Virtual Workshops](#)

to provide opportunity to get up to eight (8) Continuing Education Credits (CECs) to maintain CFM certification. Our conference

co-chairs, Holly White, CFM and Stephen Smith, CFM, have put together an excellent program with diverse topics ranging from Flood Insurance program to Resilience and Mitigation. We had a great lineup of well renowned speakers.



Date	Topic	Speakers
April 30, 2020	Update to Flood Insurance Program	Lisa Sharrard, PE, CFM, Choice Flood Insurance
May 7, 2020	Web Tools by North Carolina Emergency Management  Understanding Foundation Flood Vents and FEMA's Technical Bulletin 1B	Dan Brubaker PE, CFM, NC National Flood Insurance Program (NFIP) Engineer Zack Faulkner, CFM, Smartvent
May 21, 2020	Resiliency and Mitigation	Jessica Whitehead, NC Office of Resiliency and Recovery Gavin Smith, NC State University
June 4, 2020	Mitigation and Planning	Ryan Cox, Chip Bartlett, Chris Hilbert, Holland Consulting Planners Amanda Ohlensehlen, City of New Bern

The NCAFPM Board would like to thank all the speakers who have graciously volunteered their time to present these sessions. We can only put together these programs with support of our members. We are always looking for speakers for our webinars and conferences. Please consider presenting or encouraging others to present. It is a great opportunity to inform others about your projects and get CEC credits in the process. Please reach out to any of us on the Board if you are interested. We look forward to welcome you as our esteemed presenter!

**Jennifer M. Hudson**  
**PhD, Director of**  
**Communications**  
**Hypernet Labs**

## **What do HEC-RAS, Galileo, and Willamette Valley wines have in common?**

As any good sommelier will tell you, the character of a wine depends on the grapes, which, in turn, depend on the soil. And what determines the character of the soil? In Oregon's Willamette Valley, the answer is at least partially tied to a series of prehistoric flood events that occurred between 10 and 40 thousand years ago, carrying tens or hundreds of feet of silt to the valley floor. HEC-RAS, on the other hand, is a type of modeling software developed by the US Army Corps of Engineers for hydraulic simulations, and Galileo is the easiest way to deploy HEC-RAS runs on remote machines and cloud. The common link between all three is Kleinschmidt Associates' Chris Goodell, who built an expansive model of the Glacial Lake Missoula floods caused by the failure of a prehistoric ice dam.

## **Why Model the Dam Breach and Glacial Lake Missoula Floods in HEC-RAS?**

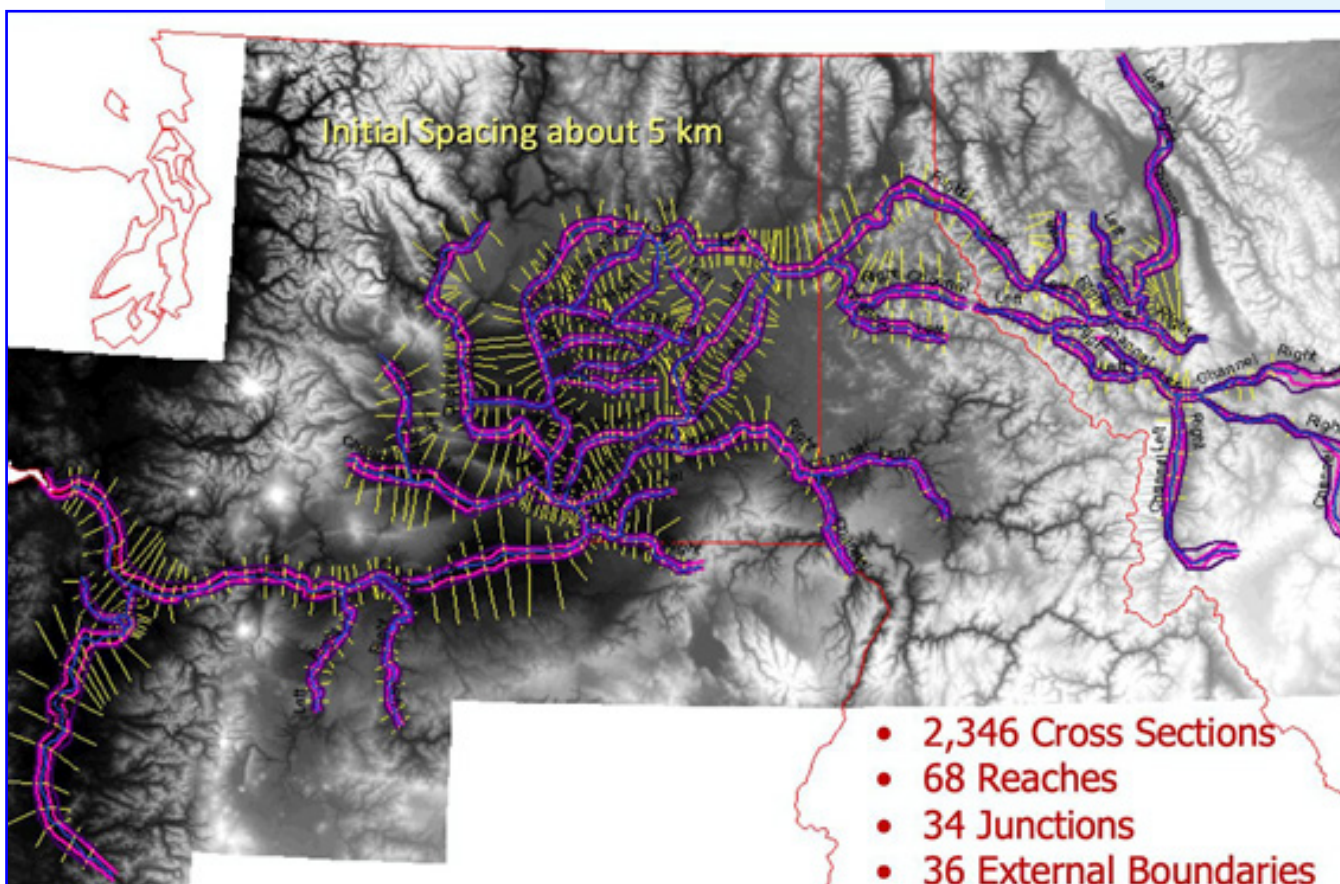
Goodell began work on this model in 2008, around the same time he launched his popular and widely respected blog, The RAS Solution. His motivation was trifold. To begin with, he was absolutely fascinated by the geology. He also wanted to challenge himself. Was he capable of setting up and running such a complex model, and was HEC-RAS capable of handling it? As a HEC-RAS expert and longtime instructor, Chris had always wondered about the software's limits, in terms of what it can actually model. To his knowledge at the time of embarking on the study, the Missoula floods were the largest magnitude dam breach event ever to be modeled in HEC-RAS.

As he started working on this in 2008, before HEC-RAS 2D was available, Goodell was initially working within a 1D framework. When Hypernet Labs learned that he had also created a model using 2D, we were eager to test Galileo by running this computationally intensive version as our own feat of strength. If Galileo can handle a remote run of a 2D simulation of the largest dam breach event ever modeled in HEC-RAS, it can run all other HEC-RAS simulations easily!

Initial inspiration for the model came from Goodell's discovery of a book by David Alt called Glacial Lake Missoula and its Humongous Floods (2001) at a conference. He had always liked geology and found it fascinating that there had been a massive flood event right where he lived. It had shaped many of the spectacular land features of the Pacific Northwest, some of which he drove past on a daily basis. Willamette Valley agriculture was made possible by the tens or hundreds of feet of nutrient dense silt deposited by the flood events from eastern Washington.

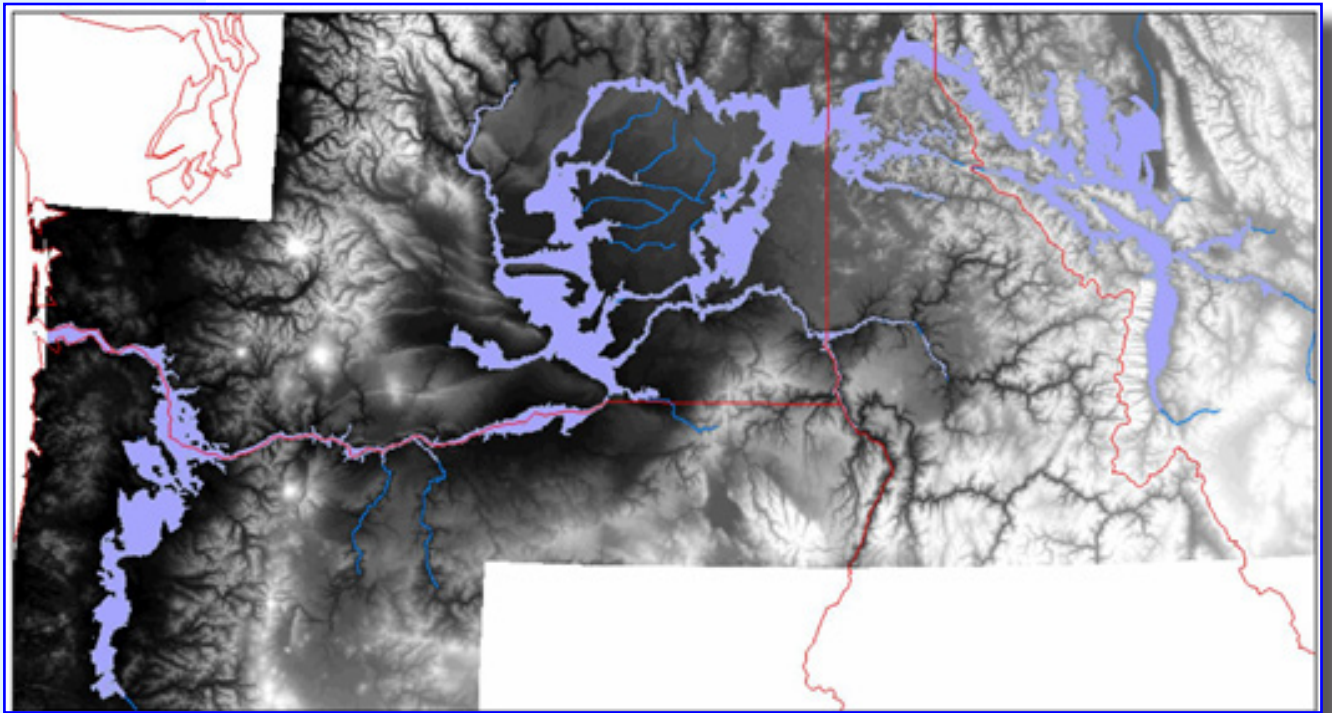
## Setting up the HEC-RAS Model

The book not only sparked his interest, Alt's work provided much of the information necessary to build the model. The large amount of available data is what made it possible to simulate the flood event, at all. There's an advantage to the fact that much of the flooding occurred in eastern Washington because the area is very dry, which means there is not a lot of vegetation to hide the geologic evidence, and there hasn't been a lot of erosion to cover things up. As a result, we have excellent aerial imagery. It's possible to see the scarring resulting from these floods just by looking at Google Earth. In fact, while calibrating the model, Goodell would run it, map the flood extents, and then compare his map to the scarring on Google Earth to see if it matched up.

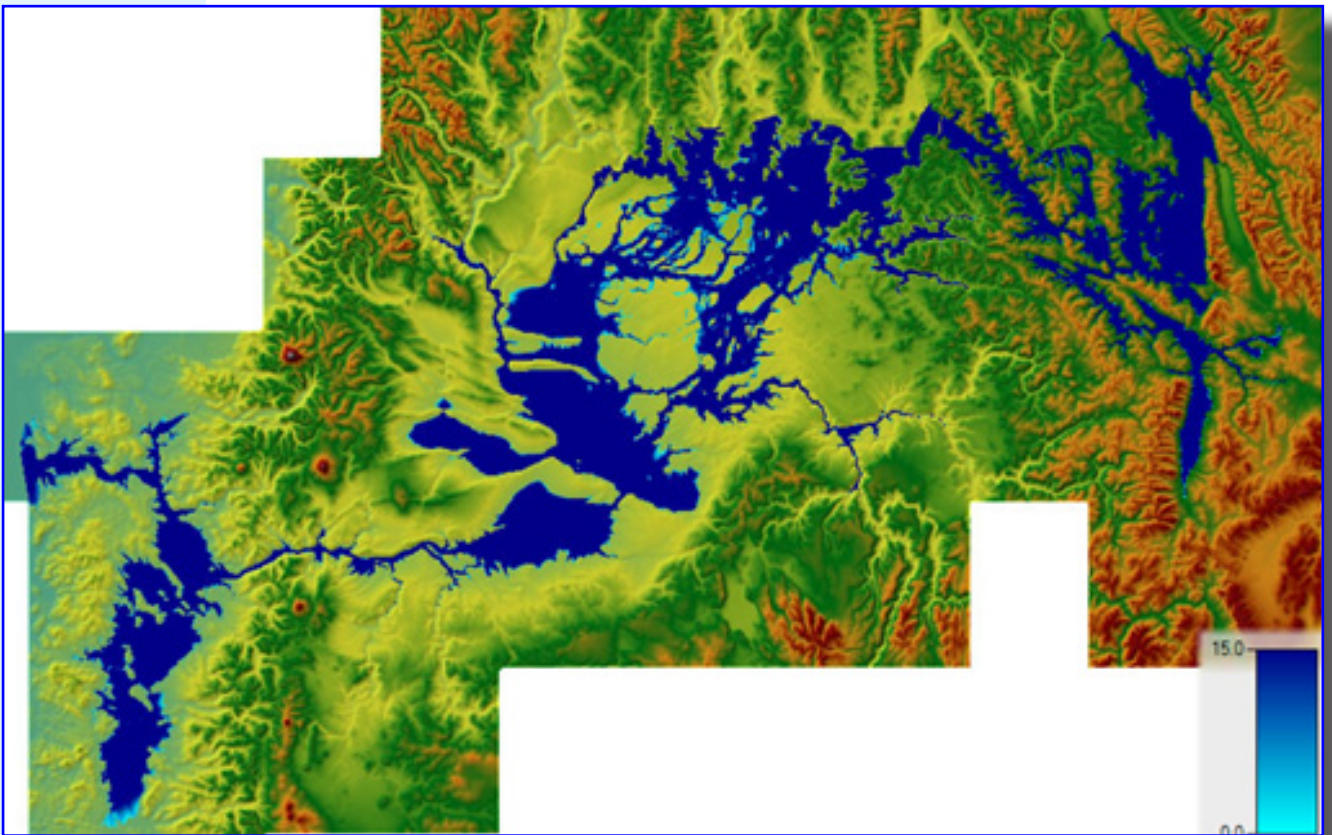


The 1D and 2D results may look fairly similar to the untrained eye, due to the skillful setup of the 1D version. However, Chris points out some significant differences between the two, including different areas that are wet or dry. In addition, 2D allows you to have different water surfaces across any given transect, but 1D allows for only one surface across each cross section. The 2D model also simply looks more sophisticated because the 2D mesh is much denser than the cross sections that are knitted together in the 1D version.





**1D model maximum inundation, 20-hr breach formation**



**2D results, images courtesy of Chris Goodell**

— continued on next page

## **Comparing HEC-RAS 1D and 2D Modeling--Advantages of 2D**

One of the biggest differences between the 1D and 2D models is time, both in terms of model setup and run time. In general, 1D modeling entails more setup time, while 2D modeling means longer run times and requires more computational power. This is where Galileo comes in, as it can help minimize the 2D modeling time commitment by quickly and easily connecting modelers to optimized machines and freeing up their local computers.

To illustrate the vast difference in set up time: Goodell spent about a month of evenings and weekends, an hour or two here and there, setting up the 1D model before he could even run it. Taking troubleshooting into account, he estimates that it was more like a couple of months before he had a working model, actually running and giving him results. Setup for HEC-RAS 2D is much faster because it uses the terrain behind the digital mesh to determine the direction of flow instead of relying on the manual input of the modeler's assumptions. With the 2D model, once Chris entered a digital terrain surface, he had it up and running within a couple of hours!

As expected, though, the 2D version took longer to run. Goodell's last, fastest run of the 1D model, after years of refining the model and clearing errors, took 44 minutes. Using Galileo, which connected him to a remote 32 core machine, the 2D runtime was 2 hours, compared to a benchmark on his computer of 3+ hours.

## **How to Handle the Computational Intensity of HEC-RAS 2D**

According to Goodell, 1D will continue to be useful, especially because 2D is so computationally intensive, "If you want to model a long reach, it's just way too prohibitive, and so you can combine 1D elements—for the efficiency—with 2D for model accuracy and make a really powerful model that way. A lot of times we'll use 1D to inform the boundary conditions for a more focused 2D area."

It's actually the computational intensity of 2D modeling that makes it such a perfect use case for us at Hypernet Labs. Galileo helps to remove the barriers to efficiency and make 2D modeling more practical by giving modelers extremely easy access to RAS-optimal machines and allowing them to run their models elsewhere, without tying up their own workstations.



## From the **NCAFPM Executive Director**



**Bill Tingle, PG, CFM**  
**NCAFPM Executive**  
**Director**

The last time I heard the term “New Normal” was when I was working with Mecklenburg County during the economic meltdown that began in 2008. I did not like the term then and I dislike it even more now. NCAFPM’s “New Normal” is the result of not only how our association changes to deal with Covid-19 impacts, but also the fact that we must deal with these issues without the ever-present support, encouragement and motivation of John Fullerton who passed away on April 23.

NCAFPM is a volunteer organization relying on the efforts of numerous people who recognize its value and the need to keep it operating during difficult times. I cannot remember a time when NCAFPM and its members have been through a tougher stretch than what we have been through the past few weeks. Covid-19 resulted in our scrambling to deal with cancellation of the spring conference as well as figuring out how we could make up for the loss of CECs from the conference. We also learned that the ASFPM annual conference in Fort Worth was cancelled.

Another major blow because several members of our Raleigh 2021 planning committee were going to Fort Worth to shadow the Texas conference team to help prepare for our hosting the national ASFPM conference in North Carolina next year. Then, while dealing with all these issues came with the shocking news of John’s passing and the loss of not only a great friend to us all, but also the loss of NCAFPM’s most ardent volunteer. Suddenly, the Covid-19 issues facing NCAFPM didn’t seem that important anymore and I wasn’t sure how or if they could be dealt with.

Our association is incredibly lucky to have some remarkable board members and others who were able to work through the grief of John’s passing to make sure NCAFPM stayed on course. People stepped up, the cancellations were dealt with, and a series of webinars were quickly organized to provide needed CECs online.

There are numerous board members and others whose efforts have kept NCAFPM moving ahead through these challenging times, including Susan Frady and her husband Dennis, Ken Ashe, Holly White, Stephen Smith, and others. However, it is our chair, Amit Sachan who stepped up and led ASFPM through the adversity. Much of Amit’s personal time was devoted to ensuring that our challenges were handled appropriately and swiftly. He stayed in constant communication with board members via email and numerous video/conference call meetings. Tasks were listed, assignments volunteered for, and schedules set. Amit even scheduled a video meeting the day after John’s passing because he knew many of us, including himself, needed to come to terms with the loss by talking to, and being with friends.

NCAFPM will come through these difficult times and learn to deal with this newest “New Normal”. These challenges will make us stronger, more resilient, better prepared, but we will never again be quite as “elegant” as we were before April 23.

*Bill*



## **Certified Floodplain Manager (CFM) Updates**

There are several items impacting the Certified Floodplain Manager (CFM) program that may impact current and future CFMs North Carolina. A description of these items is included below.

### **Accredited Chapter CFM Programs**

North Carolina is one of six accredited ASFPM chapters that administer their own state CFM program. In recent years, ASFPM has expressed concern over equitable funding and other issues which could have major impacts on the North Carolina and other accredited programs. Representatives of ASFPM and the accredited chapters have had multiple discussions on these issues (with no resolution) prior to the 2019 ASFPM annual conference in Cleveland. The ASFPM board of directors held their annual meeting at the Cleveland conference and voted to shelve the accredited state chapter issues for five years. This should result in no foreseen change in status of the NCAFPM and other accredited CFM programs.

### **NCAFPM Administration of CFM Program**

ASFPM has administered the CFM program for North Carolina since 2006. Last year, the NCAFPM board of directors voted to discontinue our contract with ASFPM and assume administration of the program ourselves. This will provide for a simpler and improved experience for NC CFMs. The current goal is to begin administration of the program January 1, 2021. However, the impacts of Covid-19 and the passing of John Fullerton may result in a later start date. We will make sure that all NC CFMs will be kept well informed of any information regarding administration of the program.

### **CFM Exams Moving from Paper to Digital**

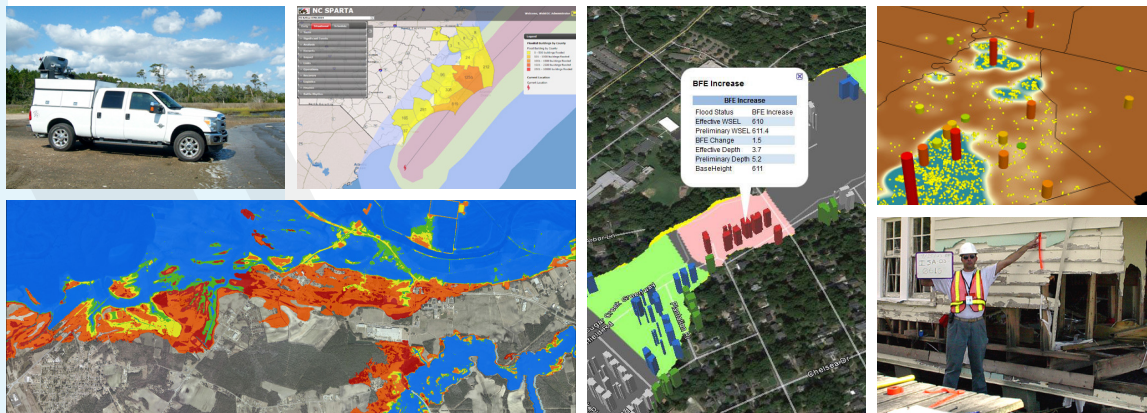
The Certified Board of Regents (CBOR) govern the national (ASFPM) and accredited state CFM programs. Their 5-year strategic plan calls for converting CFM exams from paper to an electronic format. They have engaged a vendor to explore possible options. This conversion may result in the ability for examinees to register online and then take the exam online or at a testing center. Digital exams may be available as early as next year. The exact impacts on CFM exams in North Carolina is not known at this time. Information regarding any changes to the CFM exam process will be posted at NCAFPM.org and communicated via email.

### **AICP Credit for NCAFPM Training**

NCAFPM has recently applied to become an AICP Certification Maintenance (CM) provider. When approved, planners will be able to claim continuing education credit for relevant training at NCAFPM conferences, webinars, and other offerings. ASFPM was approved as a CM provider earlier this year and NCAFPM has applied for approval as an associate chapter under their organization. It is expected that the application will be approved this summer and it will be posted at NCAFPM.org and via email notification of members.

**Written by:**  
**Bill Tingle, PG,**  
**CFM**  
**NCAFPM**  
**Executive Director**

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## **ASFPM Conference Coming to Raleigh in 2021**

Mark your calendar for May 9 - 13, 2021 — the ASFPM annual conference is coming to Raleigh! This conference is recognized as the most important floodplain conference in the United States year after year. With more than 120 speakers and 1,200 participants, it is the national conference that most community, state and federal floodplain managers plan to attend. 2021 will mark twenty years since North Carolina last hosted the ASFPM conference, held in Charlotte in 2001.

ASFPM will handle most of the logistics including hotel/meeting space, program design, exhibits, sponsors, meals, breaks, etc. However, as local host chapter, this will be a major undertaking for NCAFPM. Fortunately, Ken Ashe with Wood has agreed to serve as the local host team coordinator and will work with ASFPM and local volunteers to ensure a great conference. Some of NCAFPM's responsibilities will include: organizing "Welcome Fest" event, tours/transportation, chapter race, memorabilia, promotion/PR, field trips, golf tournament, and more. This is a huge task for NCAFPM and your help is needed! There are numerous volunteer and local sponsor opportunities available and more detailed information will be made available by mid-2020.

### **Upcoming ASFPM Annual Conferences**

Fort Worth, Texas  
June 7 - 11, 2020  
VIRTUAL

Raleigh, NC  
May 9 - 13, 2021

Orlando, Florida  
May 15-19, 2022

## **2021 ASFPM Conference**





**Ken Ashe, CFM, PE  
NCAFPM Vice-Chair**

## **CALL FOR VOLUNTEERS FOR ASFPM 2021**

The 2021 Association of Floodplain Managers Annual National Conference will be held at the Raleigh Convention Center May 9-13, 2021. The NC Association of Floodplain Managers is excited the 2021 ASFPM Annual Conference will mark the third time the Annual Conference has been held in NC, making NC only the second state to host ASFPM 3 times. 2021 is also the 20<sup>th</sup> anniversary of Charlotte serving as host to the Annual Conference in 2001. For those with the best memory, you may recall Asheville served as the host of the 14<sup>th</sup> Annual Conference in 1990.

The 2021 ASFPM Annual Conference will include more than 120 speakers and 1,200 attendees from across nation, including private partner, community, state and federal floodplain managers. The conference serves as an exiting time to meet your fellow practitioners from around the county and abroad and have opportunity to attend Training Workshops, a large selection of concurrent sessions, and several networking events.

The NC Association will serve as the host chapter for the 2021 National Conference, which allows the NCAFPM to work to provide a NC feel and welcome to the events of the conference. Serving as host also bears responsibility for a number of activities before and during the conference. To meet the duties of the host association, to be a great host to our visiting colleagues and provide the look and feel of the great State of North Carolina, the most the NCAFPM is looking to our membership and friends for volunteers to help with hosting duties. There are several opportunities to volunteer including:

- Serving as a room monitor during concurrent sessions or plenary sessions
- Serving as a Workshop Monitor
- Helping with the 5k run (the 5k is held early Wednesday morning)
- Serving as a Tour assistant or monitor
- Monitoring the Silent Auction
- Monitoring the Speaker prep room
- Providing Welcome Fest support (the Welcome Fest is held Sunday evening)
- Providing Networking Event support (the Networking Event is held Thursday evening)
- Assisting with the Silent Auction

The opportunities to volunteer include assisting with activities ahead of the Annual conference, such assisting with planning the 5k, the tours and identifying and acquiring silent auction items. We will need a strong contingent of volunteers during the Annual conference for activities such as serving as concurrent session monitors, so please do you part to help the NCAFPM host a great conference.

**If you would like to assist as a Volunteer for the 2021 ASFPM Annual National Conference, please contact the NCAFPM's Volunteer Coordinator, Ken Ashe at [ken.ashe@woodplc.com](mailto:ken.ashe@woodplc.com). Please let Ken know the type of volunteer activity you would like to participate in and how much time you will be able to contribute.**

## **OPPORTUNITIES TO ATTEND ASFPM 2021 FOR FREE OR AT A REDUCED RATE**

As you begin to look toward making plans to attend the 2021 Association of Floodplain Managers Annual National Conference to be held at the Raleigh Convention Center May 9-13, 2021, please note there are several opportunities to make registration for the conference more affordable.

### **FREE REGISTRATION FOR ASFPM 2021**

As part of the door prizes at the NCAFPM's Fall Floodplain Institute in Asheville October 20-23, 2020, ASFPM and the NCAFPM will be giving away 2 free registrations to ASFPM 2021! So, remember to make plans to join us at the Fall Floodplain Institute and put your name in the hat for the free registrations.

### **REGISTRATION SCHOLARSHIPS**

FEMA will be providing funding for scholarships to be distributed by the NCAFPM to cover the cost of registration for ASFPM 2021. Please note, only local or state employees are eligible to receive the scholarships. The application period is not open currently. The NCAFPM will make the Scholarship forms available when we provide notification of when the application period will be open. Please check the NCAFPM website frequently so you don't miss out on this opportunity to attend ASFPM 2021 for **FREE!**

### **NC LOCAL GOVERNMENT EMPLOYEE REDUCED REGISTRATION**

For all local government employees of the host state of the Annual National Conference, ASFPM provides a substantially reduced rate for registration. For the current conference in Texas, that discount for local Texas government employees is nearly 40% less than the non-member registration rate, a more than \$300 savings! For all NC local government employees please take advantage of this discount before it is gone – 2021 is your best chance to hold down the cost of attendance. Please also reach out to your colleagues to encourage their attendance when registration is the most affordable.

### **NCAFPM MEMBER REDUCED REGISTRATION**

For the 2021 Association of Floodplain Managers Annual National Conference, ASFPM will make the ASFPM Member registration rate available to all NCAFPM members. NCAFPM members do not have to be ASFPM members to take advantage of this rate. So, please maintain your NCAFPM membership through 2021 to take advantage of this 20% discount.

**Ken Ashe, CFM, PE  
NCAFPM Vice-Chair**

North Carolina Association of  
Floodplain Managers  
Board of Directors  
2019-2020



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# NCAFPM Regional Reports

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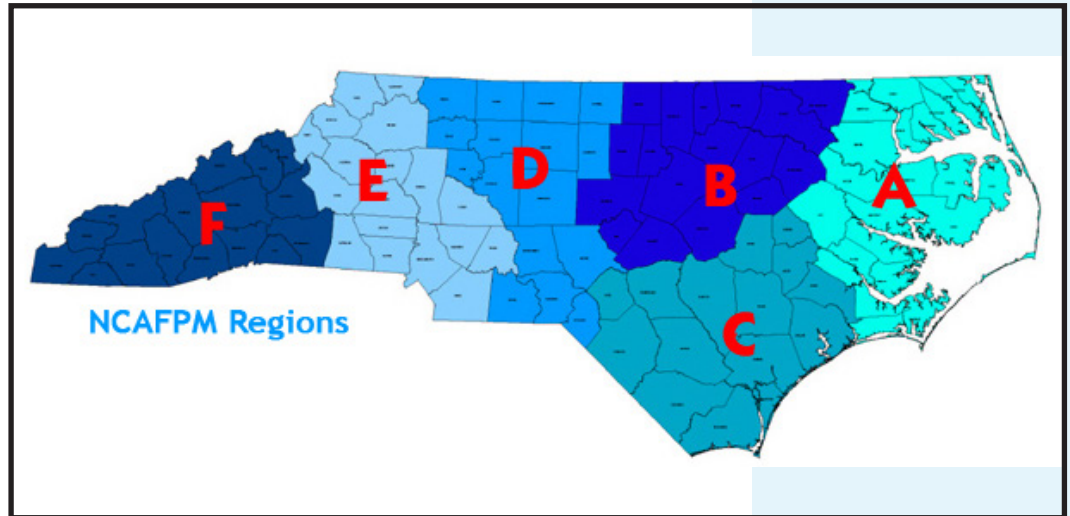
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**Region F** | Nancy Watford, CFM — [nwatford@ashevillenc.gov](mailto:nwatford@ashevillenc.gov)

North Carolina is divided into six NCAFPM regions. Our Regional Representatives give NCAFPM members in each region a “voice” on our board. Flood plain administrators in these regions can contact their representative who can bring regional issues to the board’s attention (ex. coastal erosion, flash flooding and landslides in the mountains, etc.). The map above shows the regions in a graphical format, and below is a list of the counties in each region.

**Region A** | Beaufort, Bertie, Camden, Carteret, Chowan, Craven, Currituck, Dare, Gates, Hertford, Hyde, Martin, Pamlico, Pasquotank, Perquimans, Pitt, Tyrrell, and Washington

**Region B** | Chatham, Durham, Edgecombe, Franklin, Granville, Halifax, Harnett, Johnston, Lee, Nash, Northampton, Orange, Person, Vance, Wake, Warren, and Wilson

**Region C** | Bladen, Brunswick, Columbus, Cumberland, Duplin, Greene, Hoke, Jones, Lenoir, New Hanover, Onslow, Pender, Robeson, Sampson, and Wayne

**Region D** | Alamance, Anson, Caswell, Davidson, Davie, Forsyth, Guilford, Montgomery, Moore, Randolph, Richmond, Rockingham, Scotland, Stokes, Surry, and Yadkin

**Region E** | Alexander, Alleghany, Ashe, Avery, Burke, Cabarrus, Caldwell, Catawba, Cleveland, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, Stanly, Union, Watauga, and Wilkes

**Region F** | Buncombe, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Swain, Transylvania, and Yancey

— reports begin on next page

**Pitt County**

Pitt County Planning Department adopted an updated Floodplain Development Ordinance and FIRMS on May 20<sup>th</sup> to further protect Pitt County citizens and property and allow the automatic inclusion of future map updates. These maps will become effective June 19, 2020. The FIRMS included the removal of 658 acres from special flood hazard areas, and the addition of 21 acres to special flood hazard areas. Additionally, the Planning and Development Department participated in the development of the updated Neuse River Basin Regional Hazard Mitigation Plan that will be adopted later this year.

**Pasquotank County**

Pasquotank County adopted new flood maps back in December 2018. At that time, the major change that made to the Floodplain Development Ordinance was a 2' freeboard requirement for new construction, which is the first time we have ever had a locally adopted freeboard. That new policy has surprisingly gone very smoothly.

**Coastal Federation, Manteo**

The NC Coastal Federation in partnership with Hyde County and East Carolina University are reviewing bids associated with an Request for Qualifications (RFQ) to engineer active water management within the Lake Mattamuskeet watershed. The project schedule runs from June 2020 to August 2021 and several public meetings will be hosted throughout the timeframe. Whether those meetings will be held virtually or in-person is still to be determined. More information on this project is available [www.nccoast.org/](http://www.nccoast.org/).

**Coastal Studies Institute (CSI), Wanchese**

The Coastal Studies Institute, East Carolina University's Outer Banks Campus, is a multi-institutional research and education partnership of the UNC system. Led by East Carolina University, in partnership with NC State and UNC-Chapel Hill, the Coastal Studies Institute focuses on integrated coastal research and education programming centered on responding to the needs, issues, and topics of concern of the residents of eastern North Carolina. CSI research integrates the natural and social sciences and brings together researchers from different disciplines to answer pressing coastal questions.

Currently, CSI staff are working on a number of projects related to floodplain management. This includes research on green stormwater infrastructure in Greenville focused on the stream restoration on Town Creek and a US Army Corps of Engineers Flood Risk Management Project, in the Tar, Neuse, and Lumber basins to help communities recently affected by Hurricanes Florence and Michael. The North Carolina Department of the Environmental Quality (DEQ) is leading the state effort to provide feedback for the USACE study. In addition, CSI is a research partner with NC Sea Grant (Dr. Jane Harrison) and the Town of Nags Head on a NOAA-funded project to look at how coastal flooding and sea level rise can affect onsite wastewater treatment. As part of that project, Dr. Mike O'Driscoll (CSI) and Dr. Charlie Humphrey (ECU Environmental Health Sciences) have been monitoring groundwater levels and a range of wastewater treatment systems in the region in Dare and Craven Counties, including the wastewater treatment plant on the CSI OBX campus. The goal is to evaluate how systems work in areas with shallow water tables and susceptible to coastal flooding then develop recommendations for systems that are more resilient. Lastly ECU has just kicked off an effort to develop a hazard mitigation plan for campus facilities and CSI staff are part of the committee helping to conduct that effort. This hazard mitigation plan is part of a UNC system effort to evaluate potential hazards on campuses in the eastern part of the state and develop a mitigation plans <http://www.nceastcampushmp.com/>.

## **Dare County and the Towns of Manteo, Nags Head, Kill Devil Hills, Kitty Hawk, Southern Shores, and Duck**

On June 19, 2020 new flood maps for Dare County will become effective. These maps, which also include the Towns of Manteo, Nags Head, Kill Devil Hills, Kitty Hawk, Southern Shores, and Duck, will reclassify thousands of properties currently in special flood hazard areas as Shaded X or X zone. Many of the properties reclassified as X zone or Shaded X are properties that have flooded in the past. In conjunction with the adoption of the new maps, all of the Dare governments have adopted regulations that establish regulatory flood protection elevations and other floodplain management standards for these reclassified Shaded X and X zone properties. The idea of a local elevation standard (LES) for the Shaded X and X zones was identified in 2017 by the local floodplains managers as the best way to mitigate known flooding risk in the new Shaded X and X flood zones. The development of the local elevation standard was a collaborative effort of the local floodplain managers with input from stakeholders groups solicited throughout the process. The local elevation standard for Shaded X and X zones has been well received by the local elected officials, community stakeholders and property owners. All of the governments in Dare County participate in the NFIP Community Rating System and they are working with CRS reviewers to assess how the local elevation standards for the Shaded X and X zones will be scored during upcoming five-year cycle visits in September 2020.

## **Dare and Currituck County and the Towns of Manteo, Nags Head, Kill Devil Hills, Kitty Hawk, Southern Shores, and Duck**

Dare and Currituck County and all the municipalities, including Manteo, Nags Head, Kill Devil Hills, Kitty Hawk, Southern Shores, and Duck, are participating in an update to the Regional Hazard Mitigation Plan. This regional plan is currently under review by FEMA and will be adopted by the counties and municipalities this summer.

### **Region F Updates:**

- Over the past year there have been a number of changes to staff for Buncombe County. After 47 years of service in Buncombe County, Emergency Services Director, Jerry VeHaun retired in December 2019. Serving this role since 1972, he has seen first-hand countless emergencies, including the 2004 storms which brought nearly two weeks of flooding and landslides. Buncombe County commends Jerry for a peerless career dedicated to helping those in times of great need. ([buncombecounty.org](http://buncombecounty.org)). On January 21, 2020 Van Taylor Jones joined Buncombe County as the new Emergency Services Manager. Jones previously served as the Emergency Services Director for Anderson County, SC for almost 12 years.
- Cynthia Fox-Clark, AICP, CFM, announced her retirement in January, with over 24 years of service to the citizens of Buncombe County. Cynthia, served on the NCAFP board for many years, and as Chair of the Board in 2014 - 2015. She served as the Floodplain Administrator and Planner III for Buncombe County and has a long dedicated career to her community and the NCAFP. Brad Burton, a member, was hired to fill her role. Brad has served communities in Western North Carolina for over 15 years.
- Buncombe and Madison County are working together to update the Buncombe Madison Regional Hazard Mitigation Plan. Funded through a Federal HMGP Grant in partnership with NCEM. The Kick-off meeting was held in late September, 2019.

## **Region F**

Nancy Watford, CFM



# NFIP Coordinator's Corner

Dan Brubaker, PE, CFM  
NFIP State Coordinator  
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[www.ncfloodmaps.com](http://www.ncfloodmaps.com)



## ON THE DARK SIDE

I'm sitting at home, like most of you, working. Oh, I get into the office about once per week to take care of paperwork and water the plants, but there are usually only two or three co-workers in at the same time. What I have found is that work is still getting done, even thriving, despite our situation. We are, after all, an adaptable species.

## NEW TECHNICAL BULLETINS

After years of drafts and comments, FEMA has released two updates to their Technical Bulletins. We'll discuss them here.

### TECHNICAL BULLETIN 1: FLOOD OPENINGS IN FOUNDATION WALLS AND ENCLOSURES

The new version of TB-1 incorporates some much-needed changes and updates.

First, it would be good to remember why we have openings in walls below the base flood elevation. During a flood, hydrostatic pressure, the force of standing water, builds up on the walls of crawlspaces and other enclosures. This force pushes against the wall, as if a large group of people were pushing on the wall. Without a method to balance that force, the wall could collapse without the water getting very high. The openings allow the water to balance that force, like another group of people on the other side of the wall pushing in the opposite direction. So you could say that the vents (like Darth Vader)



**Foundation Damage on Ocracoke as a Result of Hydrostatic Force**

serve to bring balance to the force. For an enclosure below the base flood elevation, that balance is achieved either by water on each side, or by a solid backing, like a stemwall or a raised concrete floor.

Conditioned crawlspaces must have flood openings. Because of energy requirements, this usually can only be achieved by using engineered vents that normally stay closed. That keeps the conditioned air in the crawlspace, rather than letting it escape to the outside. Water pressure will automatically open these vents when a flood occurs, then re-close after the water recedes.

Stem walls do not require flood openings. These are structures that are elevated above the adjacent grade on solid walls. Unlike a crawlspace, there is no open space in a stem wall, so there is nowhere for the water to go. The mass of the wall itself provides the balance to the floodwaters.



**Stemwall Foundation**

Below-grade crawlspaces, Diagram 9 on the Elevation Certificate, are those less than 2 feet below lowest adjacent grade and less than 5 feet to the next higher floor. They are allowed under the minimum NFIP requirements, but they will have significant insurance implications, as the bottom of the crawlspace floor will be considered the lowest floor for rating. Be aware that below-grade crawlspaces are not allowed in the State Model Ordinance or the State Building Code (R322.2.1) for new construction or substantial improvements.

Buildings on sloping sites need flood vents. In order to balance those hydrostatic forces, the lowest area of the enclosure should be vented so the water will not get higher than one foot against the foundation. Other vents may be placed around the structure, but these also need to be within one foot of grade.

— continued on next page

## ***Sloping Foundation***



Openings do not have to be entirely below BFE to be counted. As long as the bottom of the opening is within one foot of interior or exterior grade and the vent is otherwise compliant, the entire vent area can count towards the open space.

I've had lots of questions about whether to use the "Engineered Area" or the "Net Actual Area" in A8c and A9c (Total Net Area of Flood Openings) on the Elevation Certificate. The "Total Net Area of Flood Openings" shall be filled in with the total coverage or rated area of the engineered openings. For example, if the actual area of an opening is 72 square inches but the rated area is 200 square inches, the total net area of 10 openings would be:

$$10 \text{ openings} \times 200 \text{ sq in per opening} = 2,000 \text{ sq in}$$

Note that the State Building Code now requires flood vents in V-Zone enclosures, so those breakaway walls need flood vents, too. This is to account for floods lower than the base flood, or not involving damaging wave action.

### TECHNICAL BULLETIN 5: FREE OF OBSTRUCTION

Most of us think about our home improvement projects on nice days. Who thinks about building a garden shed or putting up a fence when the weather is horrible, right? Well in a VE Flood Zone, you have to keep the worst possible weather in mind when you make changes to your property. Otherwise, when things start getting tossed around by those waves, you can cause severe damage to your structure and your neighbors' structures. That's where Free-of-Obstruction comes in.

Technical Bulletin 5 provides guidance on methods used to avoid site development that can divert damaging floodwater and waves (called "Wave Run-up", or splashing) onto nearby structures. It also discusses ways to avoid adding



additional loads onto building foundation systems.

Some updates to TB-5 include:

- New tables comparing National Flood Insurance Program free of obstruction requirements with IBC and IRC building code requirements;
- Clarification of the design certification requirements for structures and development in V-Zones;
- New guidance on enclosed areas below elevated buildings;
- Revised guidance on building elements located below the base flood elevation;
- Revised guidance on site development, such as accessory structures, fill, and retaining walls.

### **A SUMMARY OF COASTAL REQUIREMENTS**

There are some big differences in floodplain management when you get to coastal areas. Although not intended to be an exhaustive list, and a few exceptions are possible with proper engineering, here are a few questions to ask when designing and permitting coastal development:

- Is the structure elevated on piers, piles or columns with the lowest horizontal structural member above the RFPE?
- Are forces on the foundation elements below the RFPE, like bracing and grade beams, accounted for in the foundation design?
- Is the area below the lowest floor free-of-obstruction or enclosed with breakaway walls?
  - Don't enclose recreational or living space.
  - Nothing is mounted on the breakaway walls.
  - The NC Residential Code requires flood vents in V-Zone enclosures.
- Any altering of sand dunes that can increase flood damage potential?
- Are septic tanks and underground fuel tanks designed and adequately anchored to prevent flotation, collapse, or lateral movement?
  - Designed to resist 150% of the effect of buoyancy.
  - Designed to minimize or eliminate infiltration and discharges during a flood.
- Are above-ground fuel tanks elevated above the RFPE?
- Are swimming pools elevated above the RFPE, designed to break away, or designed to remain in the ground?

- Is any fill natural material placed at less than a 5(H):1(V), or 20% slope?
- Are bulkheads and seawalls located at least 30' from any structures?

The 2019 Residential Code applies V-Zone standards to Coastal A-Zones. If you need a shapefile of the Coastal A-Zones in your community, contact the Risk Management Office or your Regional NFIP Planner and we will get them to you. Also remember that a community can delineate additional area where Coastal A-Zone requirements apply. It does not necessarily have to be seaward of a LiMWA.

One exception to the V-Zone Requirements for Coastal A-Zones is for stemwall foundations. The North Carolina Residential Code and the NFIP allow for stemwall construction in a Coastal A-Zone, provided the foundation is designed to account for wave action, debris impact, erosion, and local scour.

### **HANGING FLOORS**

Hanging floors, also known as hanging enclosures, are enclosed areas below the lowest floor that don't quite reach the ground. They are a Diagram 5 on the Elevation Certificate, and if they're below RFPE, they must be vented. I dealt with a situation recently where an Elevation Certificate was noted "in error" during a CRS review because it listed an enclosure with a Diagram 5. Rest assured that the elevation certificate was correct. Automated software was generating the error message, but we've worked with FEMA and Verisk to make sure these elevation certificates are now evaluated correctly.



***Hanging Floor – Diagram 5***

## CRS UPDATES

There is a new prerequisite for achieving Class 8—enforcement of a freeboard standard for residential buildings. At verification cycle visits after January 2021, a CRS community will be required to enforce at least 1 foot of freeboard for all new and substantially improved residential buildings in its numbered A and V Zones in order to become (or remain) a CRS Class 8 or better community. Communities that do not implement freeboard will be limited to a CRS Class 9 rating.

Until further notice there will be no in-person verification visits. ISO/CRS Specialists will be in touch with community CRS Coordinators to schedule calls and/or online meetings. ISO will do their best to complete verification visits remotely but may have to be visited later after travel restrictions are removed.

CRS will not issue a full new addition of the Coordinator's Manual in January 2021. A brief "Addendum" will be implemented in January 2021 and will be used in conjunction with the current 2017 Coordinator's Manual. The next full update is not expected until 2023.

## IN THE END

I want to fondly say goodbye to all of you. I will be starting a new chapter in my life, but I leave North Carolina with affection and gratitude for the opportunity to help all of you keep our citizens safe. Also, thanks for putting up with all of my pop-culture references in my presentations, classes, and articles. And if you saw the title of this article and thought this was about "Eddie and the Cruisers", I definitely want to hang out with you sometime.

**Please note that Randy Mundt, AICP, CFM**  
[randy.mundt@ncdps.gov](mailto:randy.mundt@ncdps.gov) 919-825-2339 will  
be acting as interim NFIP Coordinator until  
July 31, 2020 at which time he will start his  
well deserved retirement. The position has  
advertised and a replacement will be named  
later.





## State Climate Risk Assessment and Resilience Plan lays groundwork for future actions

**Press Release  
by Sharon L.  
Martin  
June 2, 2020**

RALEIGH – On behalf of the Climate Change Interagency Council, the North Carolina Department of Environmental Quality (DEQ) has submitted the [North Carolina Climate Risk Assessment and Resilience Plan](#) to Governor Roy Cooper. As directed by [Executive Order 80](#), the plan is the state’s most comprehensive effort to date, based on science and stakeholder input, to address North Carolina’s vulnerability to climate change.

“Climate change impacts the health, safety, and financial stability of North Carolinians, and we must take it head on. A resilient North Carolina is a stronger and more competitive North Carolina,” said Governor Roy Cooper.

The Climate Risk Assessment and Resilience Plan is the result of 11 months of stakeholder engagement and collaborative work with the assistance of federal partners, state universities, local governments, community planners, non-governmental organizations, climate justice leaders, stakeholders interested in nature-based solutions, and other interested partners.

“As we begin another hurricane season with even greater challenges facing North Carolina this year, the administration’s leadership has better positioned our state to prepare our most vulnerable communities,” said DEQ Secretary Michael S. Regan, chair of the Climate Change Interagency Council. “The Risk and Resilience Plan takes the experience and knowledge of the experts and leaders from across the state to ensure a comprehensive approach to address the risks to our infrastructure and economy.”

This plan is a framework to guide state action, engage policy-makers and stakeholders, and facilitate collaboration across the state and focus the state’s attention on climate resilience actions and address underlying stressors such as the changing climate, aging infrastructure, socio-economic disparities, and competing development priorities.

This plan provides:

- our best understanding of the projected change in the climate;
- climate justice impacts;

- state infrastructure, assets, programs and services within 11 critical sectors that are vulnerable and at risk to climate and non-climate stressors;
- actions currently underway; and
- recommendations for nature-based solutions to enhance ecosystem resiliency and sequester carbon in the state's natural and working lands

The 2020 Resilience Plan describes next steps for implementing and updating resilience initiatives. It builds upon North Carolina's ongoing work in this area and establishes the North Carolina Resilience Strategy, which includes four elements: (1) the North Carolina Climate Science Report, (2) State Agency Resilience Strategies, (3) Statewide Vulnerability Assessment and Resilience Strategies, and (4) the North Carolina Enhanced Hazard Mitigation Plan.

The Climate Risk Assessment and Resilience Plan, including all appendix reports, is available online at <https://deq.nc.gov/ncresilienceplan>.

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- > Stormwater best management practices

### Raleigh office

1616 East Millbrook Road  
Suite 160  
Raleigh, NC 27519  
919.876.6888

### Charlotte Office

5600 77 Center Drive  
Suite 340  
Charlotte, NC 28217  
704.665.4408

# Calendar

DETAILS FOR MANY OF THE CONFERENCES listed below are available throughout this newsletter.

**June 9-11, 2020**  
ASFPM ANNUAL CONFERENCE  
**Virtual Conference**  
Fort Worth, Tx  
[ASFPMconference.org](http://ASFPMconference.org)

**October 20-23, 2020**  
NCAFP 15<sup>TH</sup> ANNUAL  
FALL FLOODPLAIN INSTITUTE  
Crown Plaza  
Asheville, NC  
[ncafp.org](http://ncafp.org)

**May 9-13, 2021**  
ASFPM CONFERENCE  
RALEIGH, NC

# Floodplain Management

## NC Emergency Management National Flood Insurance Program

**NFIP State Coordinator: Until July 31, 2020**  
**Randy Mundt, AICP, CFM**  
[randy.mundt@ncdps.gov](mailto:randy.mundt@ncdps.gov) | 919-825-2339

**NFIP State Engineer:** Jintao Wen, P.E.  
[jinto.wen@ncdps.gov](mailto:jinto.wen@ncdps.gov) | 919-825-2317

**NFIP Planners**  
**Central Area:** Milton Carpenter, CFM  
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**Eastern Branch:** Eryn K. Futral, AICP, CFM, CFM  
[Eryn.futral@ncdps.gov](mailto:Eryn.futral@ncdps.gov) | 919-819-1734

**Western Branch:** Terry Foxx, CFM  
[terry.foxx@ncdps.gov](mailto:terry.foxx@ncdps.gov) | 828-228-8526

## NC CLOMR/LOMR Submittals

<https://flood.nc.gov/ncflood/ncfip.html>  
**LOMC Manager/Community Development**  
**Planner:** Steve Garrett, CFM  
[steve.garrett@ncdps.gov](mailto:steve.garrett@ncdps.gov) | 919-825-2316

## Maps & Flood Insurance Studies

## FEMA Map Information eXchange (FMIX)

[https://floodmaps.fema.gov/fhm/fmx\\_main.html](https://floodmaps.fema.gov/fhm/fmx_main.html)  
1-877-336-2627 (1-877-FEMA-MAP)

## Mecklenburg County CLOMR/LOMR Submittals

Technical assistance, LOMA/LOMR Requests  
877-336-2627 (877-FEMA-MAP) (toll free)

## NC Floodplain Mapping Program

**Contact for NC Floodplain Mapping Program**  
919-825-2341  
[flood.nc.gov](http://flood.nc.gov)

**Program Manager:** Tonda Shelton, CFM  
[tonda.shelton@ncdps.gov](mailto:tonda.shelton@ncdps.gov) | 919-825-2345

**Community Development Planner III:**  
Randy Mundt, AICP, CFM  
[randy.mundt@ncdps.gov](mailto:randy.mundt@ncdps.gov) | 919-825-2339

**Community Development Planner II:**  
Stacey Fuller Bobbitt, CFM  
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# Resources

updated spring 2018

## Technical Assistance (FEMA)

**National Flood Insurance Program  
Floodplain Management and  
Insurance Branch: FEMA Region IV**  
[fema.gov/region-iv-al-fl-ga-ky-ms-nc-sc-tn](http://fema.gov/region-iv-al-fl-ga-ky-ms-nc-sc-tn)

**Branch Chief:** Jason Hunter  
[jason.hunter@fema.dhs.gov](mailto:jason.hunter@fema.dhs.gov) | 770-220-5471

**Natural Hazards Program Specialist**  
Valerie Anderson  
[valerie.anderson@fema.dhs.gov](mailto:valerie.anderson@fema.dhs.gov) | 770-220-5661

**FEMA Region IV Insurance Specialist**  
Dewana Davis  
[dewana.davis@fema.dhs.gov](mailto:dewana.davis@fema.dhs.gov) | 770-220-5420

## Individual Lot LOMA/LOMR-F

FEMA LOMA DEPOT  
3601 Eisenhower Avenue  
Alexandria, VA 22304-6425  
Attn: LOMA Manager

## Flood Insurance Policy Issues

**Regional Manager:** Dewana Davis  
[dewana.davis@fema.dhs.gov](mailto:dewana.davis@fema.dhs.gov) | 770-220-5420

**Regional Liaison:** David Clukie, CFM  
[dclukie@ostglobal.com](mailto:dclukie@ostglobal.com) | 770-893-1480

## Websites

NCAFP.....[ncafp.org](http://ncafp.org)  
ASFPM.....[floods.org](http://floods.org)  
FEMA.....[fema.gov](http://fema.gov)  
NFIP.....[floodsmart.gov](http://floodsmart.gov)  
NCEM.....[ncdps.gov/Our-Organization/  
Emergency-Management](http://ncdps.gov/Our-Organization/Emergency-Management)  
NC Maps.....[ncfloodmaps.com](http://ncfloodmaps.com)  
[flood.nc.gov](http://flood.nc.gov)  
FRIS.....[fris.nc.gov/fris](http://fris.nc.gov/fris)  
FIMAN .[fiman.nc.gov/fiman](http://fiman.nc.gov/fiman)**Technical  
Assistance (State)**

**FlashFlood NEWS** is a semi-annual online publication which offers information and education on topics that are of current interest in the field of floodplain management and the National Flood Insurance Program.

Information and opinions do not necessarily reflect the views of the North Carolina Association of Floodplain Managers.

All inquiries and article ideas should be directed to Susan Frady at [sgf@comporium.net](mailto:sgf@comporium.net).

For more information about the North Carolina Association of Floodplain Managers, see our website at [ncafp.org](http://ncafp.org).

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