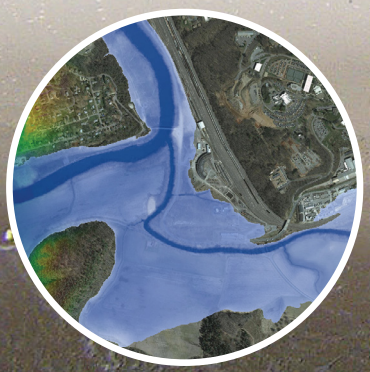
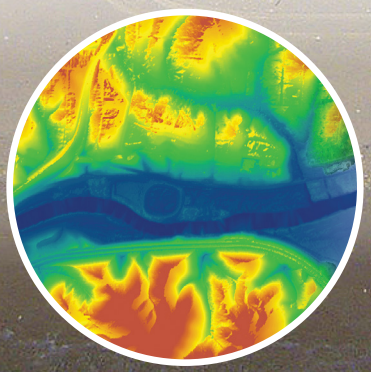
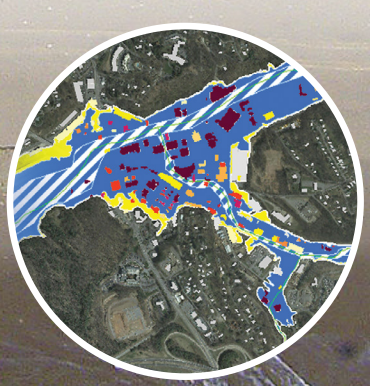
TMAC

TECHNICAL MAPPING ADVISORY COUNCIL

2018 Annual Report Summary







Background

The Technical Mapping Advisory Council (TMAC) is a federal advisory committee established under the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) and the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA) to make recommendations to FEMA on matters related to the National Flood Insurance Program (NFIP) national flood mapping program as authorized.

Each year, the TMAC produces and submits an Annual Report to the FEMA Administrator providing its insights or recommendations addressing topics defined by legislation or in the Agency tasking memo for the year. In 2018, FEMA tasked the TMAC to address three priority topics of importance to FEMA as it considers ways to improve how flood data is generated and delivered, redesigns flood risk rating for insurance, and evolves its products and services to best meet customer needs:

- Explore ways to communicate uncertainty and precision associated with data models and resulting Special Flood Hazard Areas (SFHAs) from FEMA studies without undermining risk communication and the perceived credibility of FEMA information.
- Explore the appropriate criteria FEMA should consider in prioritizing unmapped areas, considering the need to create and maintain credible data for more populous areas while inspiring good mitigation practices nationally.
- Examine how the FEMA National Flood Mapping Program may take steps to increase flood insurance coverage nationally.

Purpose

The TMAC is exploring innovative new concepts, insights and recommendations to FEMA to address these topics. The TMAC has specially prepared this pre-release summary draft of the insights it intends to deliver in its 2018 report so the public may review this summary of the concepts as posted on www.fema.gov/tmac, and submit comments to the public docket FEMA-2014-0022, or register to deliver comments in person at the TMAC Public Meeting to be held September 25-26, 2018 at the United States Geological Survey (USGS) Headquarters auditorium at 12201 Sunrise Valley Drive, Reston, VA 20192. Members of the public may register to attend by sending an email to FEMA-TMAC@fema.dhs.gov by 11:00 p.m. EDT on Wednesday, September 19, 2018. Public comment periods will take place at 4:00 p.m. EDT on Tuesday, September 25 and 11 a.m. EDT on Wednesday, September 26, as shown in the Federal Register Notice and Agenda posted online at www.fema.gov/tmac.

How may FEMA better communicate uncertainty surrounding flood hazard and its consequences?

INSIGHT AND CONCEPT

FEMA's strategic plan seeks to create a better prepared and more resilient nation by encouraging communities to undertake cost-effective protective measures in a responsible manner to reduce their future disaster losses. FEMA has an interest in and opportunity to improve the communication of the uncertainties surrounding flood hazards so that the associated impacts on people, property, and the environment (i.e. its consequences) can better assessed. This chapter highlights the technical and behavioral challenges and opportunities in communicating flood risk uncertainties to key stakeholders. These stakeholders include property owners and renters, floodplain managers, local officials, lenders, developers, and real estate agents.

Technical Aspects of Uncertainty

There are several sources of uncertainty from the atmosphere, the land, and from riverine and coastal environments that are part of a flood hazard analysis that the TMAC has identified. For each, the TMAC has also identified applicable recent advancements in reducing uncertainty and areas for future improvement in reducing uncertainty.

Communications Connections

Theoretical and empirical research over the past fifty years has revealed that decision makers exhibit systematic biases guided by emotional reactions and personal experience in dealing with uncertainty related to flood hazards and the associated consequences. FEMA will have to overcome these biases in any attempt to communicate uncertainty. Each of these are explained in more detail in this section, and include:

SYSTEMATIC BIAS	DEFINITION
Myopia	The tendency to focus on overly short future time horizons in dealing with uncertainty.
Optimism	The tendency to underestimate the likelihood that losses will occur from future hazards.
Inertia	The tendency to ignore uncertainty by maintaining the status quo.
Simplification	The tendency to focus on one element of the risk (e.g., likelihood or consequences) when there is uncertainty associated with all the elements.

Enabling Mitigation

While communicating uncertainty could be seen as further undermining confidence in FEMA's existing flood risk analysis, the TMAC believes that if done well, communicating uncertainty would help to better prepare those individuals whose homes or structures have a strong possibility of flooding. In addition to FEMA, other key stakeholders - namely, floodplain managers, local officials, lenders, and real estate agents - can play an important role in communicating to the homeowner or renter the nature of their flood hazard and risk so they become interested in considering how to mitigate the impact of flood-related disasters.

DRAFT RECOMMENDATIONS

NEW DRAFT RECOMMENDATIONS

FEMA should establish upper and lower bounds for the one percent annual chance exceedance flood elevation using a confidence interval size of their choosing, and use those limits to map the SFHA "Boundary Zone"—the area where the base floodplain boundary is most likely to be. FEMA should share SFHA Boundary Zone information with the public, test how it is received, and make improvements prior to formalizing any specific standards or policy for routine map updates.

FEMA should consider adopting a behavioral risk audit when communicating uncertainty to address the biases that characterize how individuals process information on flood risk to their property. This strategy will also be relevant for communicating uncertainty by key stakeholders, such as floodplain managers, local officials, lenders, developers, and real estate agents, to encourage property owners to invest in cost effective mitigation measures before the next flood occurs.

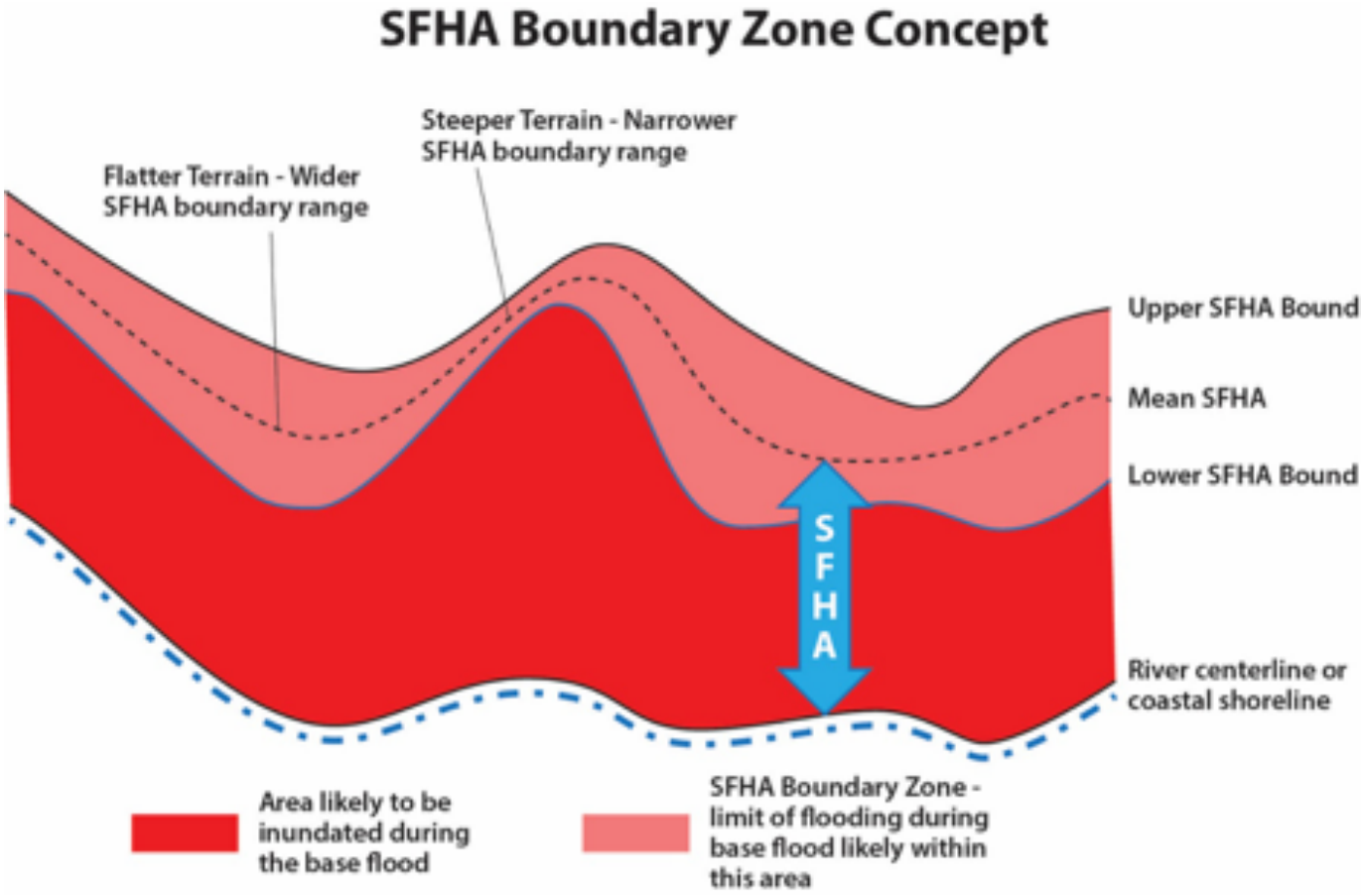


Figure 1: An example of how to display the recommended Flood Hazard Boundary Zone.

How may FEMA plan to address unmapped areas of the nation?

The national flood mapping program has traditionally prioritized the limited resources for the areas with the greatest population, the highest number of flood insurance policies, and the most flood losses. While this approach has produced modernized flood maps for 98 percent of the population, of the 3.5 million miles of streams in the nation, the flood hazard has yet to be determined on approximately 1.4 million miles (40 percent of the total). The existing inventory of studied miles are the result of a considerable investment of funding and other resources among FEMA and its State, local, and Tribal mapping partners. While maintaining the validity of the current inventory is a priority, the lack of a plan to address the unmapped areas of the Nation is a concern.

INSIGHT AND CONCEPT

Incorporating Options for Unmapped Miles into the FEMA Flood Hazard Mapping Key Decision Point Process

The FEMA Flood Hazard Mapping Key Decision Point (KDP) Process is a formal method to document the decision to advance a flood risk mapping project at key points along the workflow (FEMA, 2018). The TMAC recommends applying new criteria at two points in the workflow – at project initiation (KDP0) and prior to initiating regulatory product production (KDP2). At KPD2, an alternate production path should be introduced that leads to only non-regulatory products. This would provide risk communication products to assist otherwise unmapped communities, while avoiding the burdensome costs that come with producing regulatory products.

Screening Criteria for Unmapped Miles

Recommended criteria to be considered during KDP0 to assign a higher priority for mapping flood hazards for unmapped areas include:

(1) Areas currently designated as Zone D and include urban land use or are expected to be developed for urban land use in the near future, such as in the next 10 years.

(2) Areas that include critical infrastructure. Critical infrastructure, as discussed here, covers physical structures where flooding would result in a significant effect on public health and safety. Critical infrastructure can include but are not limited to police stations, fire stations, emergency operation centers, hospitals, schools, airports, electrical power stations, drinking water treatment plants, wastewater treatment plants, bridges, freeways, dams, etc.

(3) Areas that are downstream of an unmapped area that are subject to comingled flooding from upstream unmapped area.

(4) Areas that have repeated flood insurance claims.

(5) Areas that are experiencing or expected to experience active land use changes and growth in population.

(6) Areas that have high risks to loss of life and/or damage to property but have low population and density. This should include facilities that could have potentially significant environmental impacts if flooded, such as concentrated animal feeding operations.

The Coordinated Needs Management System (CNMS) is a system for inventorying flood hazard mapping needs for the NFIP. Note that CNMS has a GIS layer that includes unmapped miles, which could be intersected with data reflecting the above factors to help identify unmapped streams that should be considered a priority.

Unmapped Urban Flood Hazards

Unmapped urban areas have different concerns than rural areas with low population,, rural areas. Frequently, floodplain management efforts in urban areas are driven by stormwater drainage concerns instead of riverine flooding. While urban areas typically have high population densities, historically, FEMA has not mapped flood hazards resulting from stormwater drainage issues.

The modeling techniques are more complex for these areas, and thus more uncertain and expensive to develop than the models used for riverine flood hazards. Many communities have developed the expensive hydraulic models, but don't want to share them with FEMA because they don't want the restrictions associated with the regulatory maps and/or they don't want to spend additional funds to meet FEMA's modeling and mapping criteria.

DRAFT RECOMMENDATION

NEW DRAFT RECOMMENDATION

FEMA should modify its Flood Hazard Mapping Key Decision Point Process and adopt criteria to weigh the value of providing non regulatory projects even where the development of Flood Insurance Rate Maps (FIRMs) or Flood Insurance Studies (FISs) is not warranted.

How may FEMA increase flood insurance coverage nationally?

FEMA requested the TMAC to evaluate how the FEMA National Flood Mapping Program can take steps to increase flood insurance coverage nationally. The subcommittee formed to address this topic is focusing on how to leverage and enhance the current flood hazard and risk mapping products and outreach initiatives to support flood insurance rating, flood risk communication, and increasing the insured pool through policy uptake and attrition reduction.

INSIGHT AND CONCEPT

A major difficulty in convincing individuals and companies to purchase and maintain flood insurance coverage is closely related to the difficulty in communicating the ever-present risk of flooding and the uncertainty of flood events, whether in magnitude or timing.

Global weather-related disaster losses exceeded $300 billion in 2017, which made this the most costly year on record and continues a long-term upward trend. The impacts of flooding go far beyond direct damages to assets and infrastructure. Economic losses resulting from business disruption, welfare effects, and supply chain shocks can at times equal or exceed direct damage. One of the four tools the NFIP employs to reduce losses caused by flood damage was is to provide affordable flood insurance to the citizens of our nation. Flood insurance provides the policyholder with a means to recover expenses related to damaged structures and personal property losses. Unfortunately, flood insurance generally carries with it a negative connotation, despite years of public outreach before and diligent insured payouts after each flood event has occurred. A major difficulty in convincing individuals and companies to purchase and maintain flood insurance coverage is closely related to the difficulty in communicating the ever-present risk of flooding and the uncertainty of flood events, whether in magnitude or timing.

Because TMAC's charter as established by the Biggert Waters Flood Insurance Reform Act of 2012 directs the Council's attention to the National Flood Mapping Program rather than the NFIP in total, the discussion, recommendations, and implementation actions in the report will focus on approaches related to mapping, mapping products, and outreach recommendations. Additional strategies exist to make flood insurance more viable, something FEMA is addressing through its flood insurance risk rating review process.

The TMAC encourages FEMA to look beyond its current outreach efforts and NFIP products to reach all types of property owners, including renters (both residential and non-residential) who may not realize they have flood risk. Targeted marketing that acknowledges flood risks and includes best practices on how to reduce them will also help increase flood insurance coverage.

TMAC sees two overarching goals with the FEMA moonshot to double flood insurance coverage by 2022: 1) How can insurance be used to transfer flood risk? 2) How can the current culture, discussion, and thinking of the NFIP transition from an "in versus out" mentality to "what is my flood risk and what can I do to mitigate it?".

DISCUSSION

Beyond simply increasing the flood insurance policy base, the TMAC believes that the impetus behind the current task is to improve mitigation efforts to reduce flood risks and damages throughout the nation. A recent study by the National Institute of Building Sciences indicates that for every dollar invested in flood hazard mitigation, six dollars are saved . A significant part of accomplishing this task is related to better public understanding of flood risk, so communication tools (i.e. the FEMA National Flood Mapping Program) become key to success. Throughout their tenures, both this TMAC and its predecessor TMAC from 1996-2000 have made recommendations to FEMA to operate the NFIP within an all-digital, database-driven environment and emphasized that collaboration, communication, and coordination between FEMA and its stakeholders be more effective and efficient. This process has been ongoing by FEMA, and TMAC applauds the improvements. We hope to capitalize on that progress with our discussion, recommendations, and implementation actions.

As with any form of insurance, the public often makes decisions based on immediate costs and perceived benefits. The TMAC believes that additional insurance products and payment options could increase insurance coverage. However, the public will need to understand the risk and their exposure to it prior to making such an investment. This requires mapping and communication efforts, which the three sections of the TMAC 2018 Annual Report work together to address.

Individual investments in flood hazard data are unlikely to move the dial much on the purchase of flood insurance, but collectively, enhancing the outputs of flood hazard and risk identification will build a climate of better understanding that is much more likely to lead to an increase in flood insurance coverage. The TMAC reinforces the need to provide flood risk products that are clear, concise, and credible. FEMA has made significant investments in precise terrain data over the past several years; similar investments, in cooperation with other federal, state, regional, tribal, and local agencies, should be made in acquiring data to support creating comprehensive and collective views of community flood risk (e.g. rainfall, streamflow, infrastructure characteristics, etc.) that support FEMA's updated flood risk rating procedures.

Because communication to non-technical stakeholders in the NFIP is a crucial aspect to improving risk reduction and resilience, we point to Recommendation 10 from the 2015 Annual Report – transitioning from "in/out" to

structure-specific flood frequency determination and associated flood elevations. But we can further reduce perceptions of areas as "risk free." This concept may be advanced by creating non-regulatory flood risk products that leverage structure-specific analyses but generalize the data to protect privacy concerns and avoid the perception of areas as "flood risk free."

RECOMMENDATIONS

NEW RECOMMENDATION

FEMA should collect, create, and share data in a dynamic, digital environment that is functional across multiple platforms that supports historic, future, and probabilistic analyses of coastal, fluvial and pluvial flood hazards*. Data collection, creation, and sharing should support integrated water resources management and avoid data redundancies

FEMA should advance the concept of residual risk to various stakeholders by presenting additional non regulatory flood hazard and risk data. In doing so, mapping standards and specifications should be simplified and streamlined so that flood hazard products present a comprehensive view of watershed and community flood risks. The non regulatory flood hazard and risk products should support structure based risk assessments across a wide range of flood recurrences, including catastrophic events, support the actuarial rating of NFIP flood insurance, and empower informed decisions by property owners and local, regional, Tribal, and State agencies.

** This recommendation leverages and enhances previous TMAC recommendations for: 1) GIS, web-based, mobile applications (TMAC Recommendation AR 16); 2) mapping historic floods (TMAC 2016 Annual Report) ; and 3) mapping future conditions (TMAC 2015 Future Conditions Risk Assessment and Modeling Report).*

FEMA should support comprehensive and collective data and products communicating past, present and future community flood risks. Specific emphasis should be placed on partnerships that allow for enhanced coastal, fluvial, and pluvial flood hazard analyses and may include: 1) probabilistic and catastrophic flood risk assessments; 2) climatic and technical data collection and generation; 3) satellite and aerial imagery; and 4) anecdotal evidence, such as road closures and photos. The data collected should and eventually support FEMA's Risk Rating and Review initiative eventually support real-time flood forecasting and event-driven inundation mapping. This will provide FEMA additional opportunities to leverage data and programmatic efforts from other partner agencies (USGS, NOAA, USACE, etc.) and should also include efforts from citizen science sources, such as Collaborative Rain Hail and Snow (CoCoRaHS) network.

Other agencies have made significant institutional shifts to discussing "impact-based" weather and warning messages. Sharing the impacts of flood risks, rather than scientific or technical details, is a concept that could easily inform FEMA's flood hazard mapping efforts and pave the way toward increased flood insurance coverage nationwide.

PUBLIC COMMENT

Members of the public may submit their comments and thoughts around these concepts to the public docket FEMA-2014-0022, or register to deliver comments in person at the TMAC Public Meeting to be held September 25-26, 2018 at the United States Geological Survey (USGS) Headquarters auditorium at 12201 Sunrise Valley Drive, Reston, VA 20192. Members of the public may register to attend by sending an email to FEMA-TMAC@fema.dhs.gov by 11:00 p.m. EDT on Wednesday, September 19, 2018. The TMAC is a Federal Advisory Council that

operates in accordance with the Federal Advisory Committee Act (FACA) to ensure the TMAC public meetings are accessible to the public, and that the public have the opportunity to comment during the public comment periods published in the Federal Register Notice (FRN) and meeting agenda posted online at www.fema.gov/tmac.

REPORT DRAFT STATUS

It is important to note that this summary represents the content that the TMAC subcommittees have reviewed to date. Based on further discussion by the Council and public input, these concepts and recommendations may be further refined and the final report that the TMAC submits to the FEMA Administrator may have additional information and/or certain sections reduced or omitted.

FOR MORE INFORMATION

To view the TMAC reports or read summaries and agendas of previous TMAC meetings, visit the TMAC's website at: www.fema.gov/tmac. For more information on upcoming TMAC meetings, visit the Federal Register at https://www.federalregister.gov/ and search for TMAC.