TMAC

Technical Mapping Advisory Council Meeting
October 20-21, 2015

TMAC Members

Juliana Blackwell
Nancy Blyler
Richard Butgereit
Mark DeMulder
John Dorman
Leslie Durham
Scott Edelman*
Steve Ferryman
Gale Fraser*
Carrie Grassi
Chris Jones
Howard Kunreuther
Wendy Lathrop
David Mallory
Robert Mason
Sally McConkey
Luis Rodriguez
Javier Ruiz
Christine Shirley
Cheryl Small

Subcommittee Members

Doug Bellomo, U.S. Army Corps of Engineers
Ken Ashe, Amec Foster Wheeler
Dwayne Bourgeois, North Lafourche Conservation, Levee, and Drainage District
Maria Honeycutt, NOAA
Doug Marcy, NOAA
Jonathan Westcott, FEMA

Government Attendees

Kathleen Boyer, FEMA, TMAC ADFO
David Bascom, FEMA
Mark Crowell, FEMA, TMAC DFO
Christine Gallagher, NOAA
Michael Godesky, FEMA, TMAC ADFO
Lynda Pilgrim, FEMA

Registered Public Attendees

David Conrad, Water Resources Policy
Christine Gallagher, NOAA
Susan Gilson, NAFSMA
Merrie Inderfurth, ASFPM
Gilbert Jones, Dewberry
Velma Smith, PEW
Jeff Sparrow, Michael Baker International

Support Staff

Kirsten Folkedal, Booz Allen Hamilton
Laura Karnas, Booz Allen Hamilton
Jen Marcy, Atkins Global
Krista Bethune Melnar, AECOM
Meredith Tull, Booz Allen Hamilton
Adam Warfield, Booz Allen Hamilton

**Joined via conference bridge*

Purpose

The purpose of the meeting is to allow the Technical Mapping Advisory Council (TMAC) members to (1) deliberate and vote on the final draft content and recommendations to be incorporated in the 2015 Annual Report, and Future Conditions Report; and (2) discuss and coordinate on the TMAC's 2016 reports and the next steps forward, if time permits.

October 20, 2015

Welcome/ Call to Order/ Roll Call

Mr. Mike Godesky, TMAC Alternate Designated Federal Officer (ADFO), welcomed members to the meeting. He then introduced Mr. Mark Crowell, Federal Emergency Management Agency (FEMA), and Ms. Kathleen Boyer, FEMA, who serve as the TMAC DFO and ADFO, respectively. Mr. Godesky provided an overview of the conference facility and proceeded with a roll call of TMAC members. Mr. Godesky reminded everyone of the *Federal Advisory Committee Act* (FACA) compliance provisions. He informed participants that the Council will be reviewing the reports by section and deliberating and voting to adopt the content of the TMAC's required 2015 reports (including the Annual Report with mapping program recommendations specific to their charge under the *Biggert-Waters Flood Insurance Reform Act of 2012 and Homeowner Flood Insurance Affordability Act of 2014*; and the Future Conditions Risk Assessment and Modeling Report). A brief ten minute public comment period will be held prior to each vote. Members of the public will have the opportunity to provide remarks during that time, or during the designated public comment period.

The 2015 reports, to be finalized upon the conclusion of the meeting, will be delivered to the FEMA Administrator, as required, by the end of October 2015. The final versions of the reports will also be posted on the TMAC Web site, as well as the FACA database, for public access.

Following his remarks, Mr. Godesky made a motion to convene the meeting, which Mr. John Dorman, TMAC Chair, seconded.

Process Schedule/Meeting Objective

Mr. Dorman provided an overview of the agenda and discussed the meeting's objective; to deliberate and adopt, with agreed-upon amendments, the (1) *2015 TMAC: Future Conditions Risk Assessment and Modeling Report*; (2) *2015 TMAC Annual Report*; and (3) 2015 TMAC Annual Report – Executive Summary.

Mr. Dorman noted that several members were concerned with the timing of the completion of the reports as scheduled by the end of October 2015 and reminded everyone that this was the forum to discuss any additional comments and concerns. Mr. Dorman then turned the meting over to Mr. Scott Edelman, TMAC Vice Chair and Future Conditions Subcommittee Chair.

2015 Future Conditions Report and Annual Report Recommendations – Adoption

Future Conditions Report

Mr. Edelman thanked everyone for providing comments and revisions to the document. Mr. Edelman also acknowledged the chapter authors and contract support and expressed his appreciation for their exceptional contributions and adaptability in incorporating last minute changes into the reports.

Ms. Leslie Durham, TMAC member and Annual Report Subcommittee Chair, made a motion to adopt Future Conditions recommendations 1, 2, and 3. Mr. Robert Mason, TMAC Member, seconded the motion.

Future Conditions Report Draft Recommendation 1: *Provide future conditions flood risk products, and information for coastal, Great Lakes, and riverine areas. The projected future conditions should use standardized timeframes and methodologies wherever possible to encourage consistency and should be adapted as actionable science evolves.*

> Ms. Wendy Lathrop, TMAC member, questioned why "technical" had been omitted as a recommendation type, while "policy," "regulatory" and "statutory" remained. She noted that it does

not affect the recommendations, but it may impact the way the public perceives implementation of the recommendation. Mr. Edelman explained that all of the Future Conditions recommendations turned out to be "policy," so the recommendation type may not be necessary for inclusion. Ms. Lathrop made a motion to include a paragraph that precedes the recommendation table explaining the recommendation timing and type, and how the numbering refers to the body of the text. Mr. David Mallory, TMAC member, seconded. The Council unanimously approved the motion.

Several participants noted that there are differences between what is written in the body of the report and what is written in Chapter 7. TMAC members agreed that the language must be consistent throughout the report. The Council voted to include future conditions "tools" alongside flood risk products and information for coastal, Great Lakes, and riverine areas. Members noted that it is important to ensure that the sub-recommendations accurately mirror the recommendations in the body of the report. Members discussed editorial revisions and agreed on the following sub-recommendations, for adoption in the final report:

3-2 FEMA should use future risk assessments to take into account the likelihood of events occurring and their impacts, as well as the associated uncertainties surrounding these estimates.

3-4 FEMA should define a future population metric that uses a standard future population database along with various budget scenarios for keeping the data current to predict the percent of the population covered at various points in the future.

3-5 FEMA should take into account future development (excluding proposed flood control structures for the base condition/scenario) for future conditions mapping. An additional scenario can be generated that does include future flood control structures.

3-6 FEMA should use population growth as an indicator of areas with increased potential flood risk.

4-4 FEMA should develop guidance for how local zoning and land use planning can be used to identify where and how land use will change in the future, and incorporate that into local hazard and risk modeling.

4-11 FEMA should develop a policy and standards on how to consider and determine erosion zones that are outside of the Special Flood Hazard Area (SFHA) as they ultimately affect flooding and environmental conditions within the SFHA.

5-2 FEMA should use a scenario approach for future conditions flood hazards calculation and mapping that will allow users to evaluate the robustness of proposed solutions to a range of plausible future conditions including uncertain land use and climate change impacts.

Future Conditions Report Draft Recommendation 2: *Identify and quantify accuracy and uncertainty of data and analyses used to produce future flood risk information.*

Ms. Carrie Grassi, TMAC member, questioned whether sub-recommendation 3-7, "FEMA should publish a 1% and a 0.2% future design elevation layer that incorporates uncertainty and a factor of safety. Structures built to this standard would have lower flooding risk and occupant safety would be enhanced," conflicts with narrative in the Annual Report that moves away from the 1%. She also inquired about the addition of a factor of safety in the mapping. Mr. Chris Jones, TMAC member, commented that the factor of safety incorporates uncertainty. He made a motion to modify the recommendation, noting that the 1% and 0.2% elevation layer should not be singled out. He added that building design is not an issue for FEMA in terms of mapping, as much as it is for communities and building codes in developing standards. The motion was amended due to concern that the text in the report would not support the revised recommendation. Members discussed the intent of the recommendation, suggested revisions and unanimously approved the following recommendation and sub-recommendations:

Adopted Recommendation 2: Identify and quantify accuracy and uncertainty of data and analyses used to produce future conditions flood risk products, tools, and information.

3-2 FEMA should use future risk assessments to take into account the likelihood of events occurring and their impacts, as well as the associated uncertainties surrounding these estimates.

3-7 FEMA should publish multiple future conditions flood elevation layers that incorporate uncertainty so as to provide a basis for building designs that lower flood risk.

Future Conditions Report Draft Recommendation 3: *Provide flood hazard products and information for coastal and Great Lakes areas that include the future effects of long-term erosion and sea/lake level rise. Major elements are:*

- *Provide guidance and standards for the development of future conditions coastal flood hazard and risk products.*
- *Incorporate local relative sea/lake level rise scenarios and long-term coastal erosion into coastal flood hazard analyses.*
- *Consider the range of potential future natural and manmade coastal changes, such as inundation and coastal erosion.*

Members discussed potential editorial revisions for the sub-recommendations. Ms. Christine Shirley, TMAC member, motioned to combine sub-recommendations 4-9 and 4-10, "FEMA should map long-term coastal erosion hazard areas on a digital layer" and "FEMA should develop long-term coastal erosion hazard areas based on consistent methods and models." Members seconded the motion and the Council adopted the revised sub-recommendation (shown as 4-8 below). Recommendation 3 and the following sub-recommendations were adopted:

Adopted Sub-recommendations:

4-1 FEMA should use a scenario approach when considering shoreline location for the estimation of future conditions flood hazards. At least two scenarios should be evaluated, one in which the shoreline is held at its present location, and another in which the shoreline is eroded according to the best available shoreline erosion data.

4-6 FEMA should develop guidance for incorporating future conditions into coastal inundation and wave analyses.

4-8 FEMA should develop consistent methods and models for long-term coastal erosion hazard mapping.

5-4 FEMA should use Parris et. al, 2012, or similar global mean sea level scenarios, adjusted to reflect local conditions, including any regional effects (Local Relative Sea Level) to determine future coastal flood hazard estimates. Communities should be consulted to determine which scenarios and time horizons to map based on risk tolerance and criticality.

5-5 FEMA should work with other Federal agencies (ex. NOAA, USACE, USGS), the U.S. Global Change Research Program (USGCRP), and the National Ocean Council to provide a set of regional sea-level rise scenarios, based on the Parris et al, 2012 scenarios, for the coastal regions of the U.S. out to the year 2100 that can be used for future coastal flood hazard estimation.

5-7 FEMA should prepare map layers displaying the location and extent of areas subject to long-term erosion and make the information publicly available. Elements include:

- *Establishing the minimum standards for long-term erosion mapping that will be used by FEMA that must be met by partners / communities if it is to be incorporated into the FEMA products.*
- *Working with Federal, State, and local stakeholders to develop these minimum standards via pilot studies.*
- *Securing funding that can support sustained long-term erosion monitoring and mapping by allowing for periodic updates.*

5-9 FEMA should support additional research to characterize how a changing climate will result in changes in Great Lakes and ocean wave conditions, especially along the Pacific Coast. The relative importance of waves on this coast makes this an important consideration.

5-10 For the Great Lakes, the addition or subtraction of future lake level elevations associated with a changing climate is not recommended at this time due to current uncertainty in projections of future lake levels.

5-11 FEMA should build upon the existing current conditions flood hazard analyses prepared by FEMA for the National Flood Insurance Program (NFIP) to determine future coastal flood hazards.

5-12 FEMA should incorporate local Relative Sea Level Rise (RSLR) scenarios into the existing FEMA coastal flood insurance study process in one of the following ways:

- *Direct Analysis – Incorporate sea level rise directly into process modeling (ex. surge, wave setup, wave runup, overtopping, and erosion) for regions where additional sea level is determined to impact the BFE non-linearly (ex. 1FT SLR = 2FT or more BFE increase).*
- *Linear Superposition – Add sea level to the final calculated total water level and redefine base flood elevation for regions where additional sea level is determined to impact the BFE linearly (ex. 1FT SLR = 1FT BFE increase).*
- *Wave effects should be calculated based on the higher Stillwater including sea level rise.*

5-13 Maps displaying the location and extent of areas subject to long-term coastal erosion and future sea level rise scenarios should be advisory (non-regulatory) for Federal purposes. Individuals and jurisdictions can use the information for decision-making and regulatory purposes if they deem appropriate.

Participants made a motion to adopt Future Conditions Report recommendations 1, 2, and 3. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There were no comments from the public. Following the public comment period, Mr. Dorman called for a vote on Future Conditions Report recommendations 1, 2, and 3, as amended, which the TMAC members unanimously adopted.

Future Conditions Report Draft Recommendation 4: *Provide future conditions flood risk products and information for riverine areas that include the impacts of: future development, land use change, erosion, and climate change, as actionable science becomes available. Major elements are:*

- *Provide guidance and standards for the development of future conditions riverine flood risk products.*
- *Future land use change impacts on hydrology and hydraulics can and should be modeled with land use plans and projections, using current science and build upon existing model study methods where data are available and possible.*
- *Future land use should assume built-out floodplain fringe and take into account the decrease of storage and increase in discharge.*
- *No actionable science exists at the current time to address climate change impacts to watershed hydrology and hydraulics. If undertaken, interim efforts to incorporate climate change impacts in*

flood risk products and information should be based on existing methods, informed by historical trends, and incorporate uncertainty based upon sensitivity analyses.

- *Where sufficient data and knowledge exist, incorporate future riverine erosion (channel migration) into flood risk products and information.*

Mr. Jones suggested that draft sub-recommendation 5-18 (revised as 5-17 below), "Individuals and localities can adopt higher future conditions standards as they deem appropriate," belongs in the body of the report and not as a recommendation. Members discussed ways of revising the recommendation in order to make it actionable. Mr. Godesky reminded the members of their legislative mandate *from Biggert-Waters Flood Insurance Reform Act of 2012* (BW-12), which requires the TMAC to make recommendations to the FEMA Administrator. Ms. Lathrop cautioned TMAC members about being too prescriptive in their recommendations. The Council agreed to revise the language to read, "FEMA should produce, and should encourage communities to adopt, future conditions products to reduce flood risk." Mr. Mason also noted that sub-recommendation 5-6, "At the current time, available and actionable science does not support the development of a single, nationwide method for determining future riverine flood risk boundaries based on projected future changes to the watershed due to geomorphological or climate changes," read as commentary and not a recommendation, and motioned to remove it from the recommendation list. Mr. Edelman countered that it was a major finding and that the sub-recommendation should remain in the report. Participants discussed ways of incorporating the sub-recommendation as supporting text in another sub-recommendation, but came to the agreement that sub-recommendation 5-6 should be removed.

Adopted Sub-recommendations:

4-7 FEMA should evaluate previously-issued guidance for future conditions land use and hydrology to incorporate best practices and lessons learned from communities that have implemented the guidance since 2001.

4-9 FEMA should determine long-term riverine erosion hazard areas for areas subject to high erosion and provided to the public in a digital layer.

4-10 FEMA should utilize a national standard for riverine erosion zone delineations that reflects geographic variability.

5-6 FEMA should take the impacts of future development and land use change on future conditions hydrology into account when computing future conditions for riverine areas.

5-8 FEMA should implement riverine erosion hazard mapping (E Zones that define channel migration zones), leveraging existing data, models, and approaches that reflect site-specific processes and conditions.

5-15 FEMA should use observed riverine trends to help estimate what future conditions might look like. In watersheds where floods of interest may decrease in magnitude and frequency then use existing riverine study results as the basis for flood hazard mapping. In watersheds where floods exhibit increase in magnitude or frequency then use best available science to determine future hydrology and flood hazards.

5-16 FEMA should work with other Federal agencies via the Advisory Committee on Water Information sub-committee on hydrology to produce a new method to estimate future riverine flood flow frequencies. This method should contain ways to consistently estimate future climate-impacted riverine floods and address the appropriate range of flood frequencies needed by the NFIP.

5-17 FEMA should produce, and should encourage communities to adopt, future conditions products to reduce flood risk.

Future Conditions Report Draft Recommendation 5: *Generate future conditions data and information such that it may frame and communicate flood risk messages to more accurately reflect the future hazard in ways that are meaningful to and understandable by stakeholders. This should enable users to make better-informed decisions about reducing future flood-related losses.*

Members had no revisions for recommendation five or its associated sub-recommendation:

3-3 FEMA should frame future risk messages for future conditions data and information such that individuals will pay attention to the future flood risk. Messages may be tailored to different stakeholders as a function of their needs and concerns.

Future Conditions Report Draft Recommendation 6: *Perform demonstration projects to develop future conditions data for representative coastal and riverine areas across the nation to evaluate the costs and benefits of different methodologies or identify/address methodological gaps that affect the generation of future conditions data.*

Ms. Blackwell motioned to change the last sentence in sub-recommendation 5-15 (revised as 5-14 below), "FEMA should support research for future conditions coastal hazard mapping pilots and case studies using the latest published methods to determine the best means to balance the benefits of efficient methods against the higher cost and additional time associated with reducing accuracy and decreasing uncertainty" from "reducing accuracy and increasing uncertainty" to read as "improving accuracy and decreasing uncertainty." The motion was seconded. Ms. Lathrop said that there is a balance between the cost and reduced accuracy. Mr. Howard Kunreuther, TMAC member suggested revising the sub-recommendation to say "affect accuracy" instead of increase or decrease, as the TMAC cannot make a judgement on what exactly would happen. Mr. Steve Ferryman, TMAC member added that there must be a study on the cost of doing future conditions. Mr. Doug Marcy, TMAC subcommittee member, said that SMEs briefed the subcommittee about existing pilots and using more simplistic methods. He added that it is a waste of money to try do detailed modeling and direct analysis if it may not improve the accuracy and recommended performing a cost-benefit analysis. Mr. Marcy said that he would refine the sub-recommendation. Mr. Jones suggested revising the sub-recommendation to say "balance the cost and benefits of increasing accuracy and decreasing uncertainty," to which members agreed. Ms. Grassi recommended changing the term "generations" to "creation" in draft recommendation six. Members seconded and unanimously approved the change. Members discussed and motioned to adopt draft recommendation six and its associated sub-recommendations, as follows:

Adopted Sub-recommendations:

3-1 FEMA should perform a study to quantify the accuracies, degree of precision and uncertainties associated with respect to flood studies and mapping products for existing and future conditions. This should include the costs and benefits associated with any recommendation leading to additional requirements for creating flood related products.

5-3 FEMA should conduct future conditions mapping pilots to continue to refine a process and methods for mapping and calculating future flood hazards and capture and document best practices and lessons learned for each.

5-14 FEMA should support research for future conditions coastal hazard mapping pilots and case studies using the latest published methods to determine the best means to balance the costs and benefits of increasing accuracy and decreasing uncertainty.

TMAC members motioned to adopt Future Conditions Report recommendations 4, 5 and 6, as amended. The motion was seconded and the floor was opened for a public comments. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There were no comments from the public. Following the public comment period, Mr. Dorman called for a

vote on Future Conditions Report recommendations 4, 5, and 6, as amended, which the TMAC members unanimously adopted.

Future Conditions Report Draft Recommendation 7: *Data and analysis used for future conditions flood risk information and products should be consistent with standardized data and analysis used to determine existing conditions flood risk (currently defined in the NFIP Guidelines and Specifications for Flood Hazard Mapping Partners), but also should include additional future conditions data, such as climate data, sea level rise information, long-term erosion monitoring, land use planning data, planned restoration projects, planned civil works projects, as appropriate, that would impact future flood risk.*

The Council discussed the purpose of sub-recommendation 4-1, "FEMA should leverage hydrography and watershed boundary datasets for future conditions floodplain mapping" and what is meant by "leveraged datasets." A motion was made to replace "leverage" with "best available data"; however, members were unsure if this new language fit and the motion was withdrawn. A new motion to delete the sub-recommendation altogether was offered, seconded, voted upon, and adopted.

Ms. Sally McConkey, TMAC member, requested clarification on sub-recommendation 4-6 (shown as 4-5 amended below), asking if it included hydraulics or hydrology. Mr. Mallory commented that both could be included and motioned for the change. The motion was seconded and approved by the Council to include both hydraulics and hydrology.

Members discussed overall draft recommendation seven, and suggested several revisions, including replacing "long term erosion monitoring" with "long term erosion data," removing the language in parentheses, and adding "develop scenarios that consider" to follow long term erosion data. Members agreed to amend the overall recommendation to reflect the suggested changes.

Mr. Ferryman motioned to remove the last sentence in sub-recommendation 4-14 (shown as amended as 4-12 below) which read "Future conditions in one area of the country should be similar to future conditions in other parts of the country." The Council agreed that it should be removed. Ms. Durham motioned to adopt recommendation 7 and its associated sub-recommendations as shown below:

Adopted recommendation 7: Data and analysis used for future conditions flood risk information and products should be consistent with standardized data and analysis used to determine existing conditions flood risk, but also should include additional future conditions data, such as climate data, sea level rise information, long-term erosion data; and develop scenarios that consider land use plans, planned restoration projects, and planned civil works projects, as appropriate, that would impact future flood risk.

4-2 FEMA should support expanded research innovation for water data collection, for example using Doppler radar.

4-3 FEMA should use a scenario approach to evaluate the impacts of future flood control projects on future conditions flood hazards.

4-5 FEMA should support research on future conditions land use effects on future conditions hydrology and hydraulics.

4-12 FEMA should develop guidance for evaluating locally developed data from States and communities to determine if it is an improvement over similarly-available National data sets and could be used for future condition flood hazard analyses.

4-13 FEMA should develop better flood risk assessment tools to evaluate future risk, both population-driven and climate-driven. Improve integration of hazard and loss estimation models (such as HAZUS) with land use planning software designed to analyze and visualize

development alternatives, scenarios, and potential impacts to increase use in local land use planning.

5-1Future flood hazard calculation and mapping methods and standards should be updated periodically as we learn more through observations and modeling of land surface and climate change, and as actionable science evolves.

Ms. McConkey seconded the motion and the floor was opened for public comments.

Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. Two members of the public provided oral comments.

Ms. Susan Gilson, National Association of Flood & Stormwater Management Agencies (NAFSMA), made the following comment:

I have a suggestion for recommendation 7. I was listening to your second sentence and I think this recommendation is so long and it's hard to follow, even though I understand the gist. In looking at Sally's modification, maybe you want to consider addressing the planned civil works projects as appropriate. Also, restoration has a lot of different meanings. What do you mean by that? My other question is: Looking at this with clean eyes and I have a question over the way the sub-recommendation are categorized. Some of us are looking at this as a fresh document that stands alone and when you do that your sub-numbering system does not make sense. That might have been Wendy's clarification. That might help, but if we can link with each individual recommendation that we're talking about, it would be helpful. When you are looking at this as a piece that can stand on its own, and when looking at a new person the numbering throws you off. Just when you think you have the key, it doesn't match up.

Mr. David Conrad, Water Resources Policy, made the following comment:

I will submit a paper I wrote for Gilbert forum to the committee. But it has been a concern listening for weeks and months that the discussion that started back when Doug Bellomo was here has dropped out of the general discussion. It was the idea of supporting the non-regulatory data layers of natural resources values, natural resource functions that may be affected by future conditions. So many communities need that kind of data, hopefully in accessible form, to make land use decisions that will be relevant to flood insurance programs, FEMA's work and the nations land use planning. So I have a paper I will leave with the committee. To that affect, in the 7.4 provision there may be an opportunity to point to that. The issue would be natural resource impacts on future conditions on the environment and sustainability impacts on natural resources included as data layers and flood mapping to assist land use decisions.

Following the public comment period, Mr. Dorman called for a vote on Future Conditions Report recommendation 7, as amended, which the TMAC members unanimously adopted.

2015 Annual Report

Ms. Durham provided a brief overview of the document's organization, including identifying gaps and redundancies. She noted that the biggest revision that occurred during report editing was that a lot of content from Chapter 4, *2015 Topics and Recommendations*, moved to Chapter 2, *Background*.

2015 Annual Report Section 4.1 – Community of Users and Uses

2015 Annual Report Draft Recommendation No. 1: *FEMA should establish and implement a process to assess the present and anticipated requirements of flood hazard and flood risk products to meet the needs of the various users. As part of this process, FEMA should routinely;*

a) *Conduct a systematic evaluation of current regulatory and non-regulatory products (data, maps, reports, etc.) to determine if these products are valued by users, eliminating products which do not cost effectively meet needs;*
b) *Consider user requirements prior to any updates or changes to data format, applications, standards, products or practices are implemented; and*
c) *Proactively seek to provide authoritative, easy to access and use, timely, and informative products and tools.*

Mr. Jones motioned to delete the phrase "requirements of" flood hazard and flood risk products, and Ms. McConkey seconded the motion. The motion was approved by the Council. The Council motioned, and seconded, to adopt the first recommendation.

2015 Annual Report 4-2 – Flood Hazard Identification – Program Goals and Priorities

2015 Annual Report Draft Recommendation No. 2: *FEMA should develop a national 5-year flood hazard and risk assessment plan and prioritization process that aligns with program goals and metrics (See Recommendation No.3). This should incorporate a rolling 5-year plan to include the establishment and maintenance of new and existing studies and assessments in addition to a long-term plan to address the unmapped areas. Mapping and assessment priorities should be updated annually with input from stakeholders (e.g., MHIP). The plan should be published and available to stakeholders.*

Mr. Kunreuther commented that when "FEMA" is used, it is also referring to FEMA's mapping partners (including the private sector) and suggested adding "and their mapping partners" to the recommendation. Ms. Shirley responded that adding mapping partners is unnecessary as FEMA sets the tone for its partners. Mr. Kunreuther also suggested adding "that include estimates of climate change" in risk assessments. Members discussed the idea of incorporating future conditions in the five-year plan, and noted that the intent of the recommendation is to plan for mapping projects. Participants also discussed the relevance of future conditions considerations in the Annual Report. Members voted and agreed to amend recommendation 1 to include a fourth sub-bullet to read, "Consider future flood hazards and flood risk."

2015 Annual Report Draft Recommendation No. 3: *FEMA should develop National Flood Hazard and Risk Assessment Program goals that include well-defined and easily quantifiable performance metrics. Specifically the program goals should include metrics for the following:*
a) *Maintaining an inventory of valid (verified), expiring, unverified, and unknown, flood hazard miles;*
b) *Addressing the non-modernized areas of the Nation and unstudied flood hazard miles; and*
c) *Conducting flood risk analysis and assessments on the built environment; and*
d) *Counting population having defined floodplains using a stream level performance indicator for a better representation of study coverage.*

Mr. Jones made a motion to approve the recommendation. The motion was seconded for the Council to adopt the recommendation.

2015 Annual Report Section 4-3 – Flood Hazard Identification – Core Data, Models, and Methodology

2015 Annual Report Draft Recommendation No. 4: *FEMA should work with Federal, state, and local partners to ensure topographic, geodetic, water-level, and bathymetry data for the flood mapping program is collected and maintained to Federal standards. Future FEMA topographic and bathymetric LiDAR acquisition should be consistent with 3DEP and Interagency Working Group on Ocean and Coastal Mapping standards and all geospatial and water level gauge data for the flood mapping program should be referenced to current national datums and the National Spatial Reference System. Water level gauge datums for active gages should be referenced to current national datums and the National Spatial Reference System to the extent practical, datums for inactive gages should be converted to meet these standards.*

The Council discussed the inclusion and deletion of single words for clarity. Participants agreed to include "tribal" partners, and remove "and water level gauge" from the recommendation. The Council motioned, and seconded, to adopt the recommendation.

2015 Annual Report Draft Recommendation No. 5: *FEMA should document the horizontal and vertical accuracy of topographic data input to flood study models and the horizontal and vertical accuracy of topographic data used to delineate the boundaries of the flood themes. These data should be readily available to users, and clearly reported with products.*

Members discussed the difference between horizontal and vertical topographic data in the flood study and the data used to delineate flood zones and whether it is necessary to distinguish the two. Ms. McConkey emphasized the importance of the difference between horizontal and vertical accuracy. Ms. Durham motioned to adopt recommendation 5. Mr. Kunreuther seconded the motion, and the recommendation was approved by the Council.

2015 Annual Report Draft Recommendation No. 6: *FEMA should periodically review and consider use of new publicly available statistical models such as the proposed Bulletin 17C, for flood-frequency determinations.*

Ms. McConkey motioned to adopt the recommendation. Ms. Lathrop seconded the motion, and the motion was approved by the Council.

2015 Annual Report Draft Recommendation No. 7: *FEMA should develop guidelines, standards and best practices for selection and use of riverine and coastal models appropriate for certain geographic, hydrologic, and hydraulic conditions.*

a) *Provide guidance on when appropriate models would be 1-D vs 2-D, or steady state vs unsteady state;*
b) *Support comparative analyses of the models and dissemination of appropriate parameter ranges; and*
c) *Develop quality assurance protocols*

Mr. Jones made a motion to adopt the recommendation. Ms. Shirley seconded the motion and the motion was approved by the Council without further discussion.

2015 Annual Report Draft Recommendation No.8: *FEMA should develop standards and best practices related to coastal 2-D storm surge modeling in order to expand the utility of the data and more efficiently perform coastal flood studies.*

Mr. Jones made a motion to adopt this recommendation and Ms. McConkey seconded the motion. Mr. Rodriguez noted that this recommendation is listed as regulatory but FEMA considers guidelines, standards, and best practices as policy. Ms. McConkey suggested the addition of "guidelines." Mr. Jones agreed with this modification and the motion was approved, as amended, by the Council.

2015 Annual Report Draft Recommendation No. 9: *FEMA should review and update existing coastal event-based erosion methods for open coasts, and develop erosion methods for other coastal geomorphic settings*.

Mr. Jones motioned to adopt the recommendation and Ms. McConkey seconded the motion. Dr. Maria Honeycutt, SME, noted that this recommendation has a regulatory component, and the recommendation type should be designated as both regulatory and policy. Mr. Dorman explained that the recommendation type will be reflected in the narrative. The motion was adopted by the Council without further discussion.

A motion was made, and seconded, to adopt the first nine recommendations, as amended, from 2015 Annual Report sections 4-1, 4-2, and 4-3. Mr. Godesky announced that members of the public were

invited to provide comments on the issues considered by the TMAC. There were no comments from the public.

Following the public comment period, Mr. Dorman called for a vote to adopt the first nine recommendations, as amended, from 2015 Annual Report sections 4-1, 4-2, which the TMAC members unanimously adopted.

2015 Annual Report Section 4-4 – Flood Hazard Identification – Production Processes

2015 Annual Report Draft Recommendation No. 10: *FEMA should transition from identifying the 1-percent-annual-chance floodplain and associated base flood elevation as the source for insurance determinations to a structure specific flood frequency determination and associated base flood elevation.*

Ms. Durham motioned to adopt the recommendation, and Mr. Jones seconded the motion. Mr. Kunreuther made a motion to include "mapping partners and the private sector" to highlight that this change is not something FEMA can do alone and that the transition will require additional resources. Ms. Shirley noted that this recommendation entails a regulatory change for FEMA, and Mr. Jones added that this recommendation is meant to be borne by FEMA. Mr. Kunreuther's motion was denied. Ms. Byler made a motion to change to "insurance determination" to "insurance rating purposes." There was a motion to adopt the recommendation as amended. The motion was approved by the Council.

2015 Annual Report Draft Recommendation No. 11: *FEMA should modify the current work flow production process and supporting management system, Mapping Information Platform, to reduce unnecessary delays created by redundant tasks and inflexibility of the system. The process and system are currently not designed to properly manage non-regulatory products or products that do not fit predefined footprints. FEMA should modify the system to enable flexibility in project scope and size such as the choice of watershed size, not limiting projects to only the hydrologic unit code 8 (HUC8).*

Mr. Mallory made a motion to adopt the recommendation. The motion was seconded and approved by the Council, without further discussion.

2015 Annual Report Draft Recommendation No. 12: *FEMA should evaluate its process to determine cost impact when new requirements are introduced and provide guidance to consistently address the cost impact to all partners.*

Members discussed if the recommendation should include a cost-benefit analysis. A motion was made to change the language of the recommendation to read, "FEMA, in its update of guidance and standards, should determine the cost impact when new requirements are introduced and provide guidance to consistently address the cost impact to all partners." Mr. Javier Ruiz, TMAC member, commented that narrative supporting the recommendation will need to make clear that the intent is not about a cost-benefit analysis. A motion was made, and seconded, for adopting the recommendation as amended.

2015 Annual Report Draft Recommendation No. 13: *FEMA should develop guidelines and procedures to integrate a mass LiDAR-based LOMA process into the National Flood Hazard and Risk Assessment Program. As part of this process, FEMA should also evaluate the feasibility of using parcel and building footprint data to identify eligible out as shown structures as an optional deliverable during the flood mapping process.*

Ms. Lathrop suggested adding quotes around "out as shown" because that is the language on the Letter of Map Amendment (LOMA). Mr. Dorman commented that the report's narrative speaks to that. A motion was made to adopt the recommendation, as amended with "out as shown," and the motion was seconded and approved for inclusion in the report.

2015 Annual Report Section 4-5 – Flood Risk Assessment and Communication

2015 Annual Report Draft Recommendation No. 14: *FEMA, and its mapping partners including the private sector, should adopt a flood risk assessment focus that is structure specific. It should be noted that flood hazard identification is an essential component in performing flood risk assessment and must be performed prior to any flood risk assessments. However, to advance preventive and mitigating strategies and as well as support loss estimations for insurance rating purposes, flood risk assessments should be the focal point. Towards this new focus:*

a) FEMA should establish an Implementation Plan for Structure-Specific Flood Risk Assessments;
b) FEMA should initiate dialogue with risk assessment stakeholders to define structure-specific risk assessment products, displays, standards, and data management;
c) FEMA should draw from and leverage partners and programs successfully performing risk assessments; and
d) Where data exists that appropriately supports structure-specific risk assessments or can be leveraged from partners, FEMA should accommodate and support such structure-based risk assessments.

Participants motioned to adopt the recommendation. Ms. Lathrop commented that she thought there was another phrase at the end of the first sentence that says that "FEMA and its mapping partners, including the private sector, should adopt a flood risk assessment focus that is structure specific *as data is available*." Mr. Ferryman supported this former addition. The motion was seconded and approved by the Council. Mr. Jones commented that FEMA may not be able to achieve this recommendation and that it will place a burden on FEMA to perform individual information gathering and maintenance that they cannot do.

Ms. Durham commented that this recommendation was important and transformative and believes hazard identification needs to come first. Mr. Mason suggested this recommendation be addressed in the 2016 Annual Report. Ms. Lathrop commented that the Council should not recommend for FEMA to be in the business of knowing if structures have changed and the effects of structure specific determinations. Ms. Lathrop suggested saying FEMA should assist its mapping partners in this effort. Mr. Kunreuther believes that if the recommendation is not included, FEMA will maintain the status quo. Mr. Jones clarified that he does not want to see FEMA be responsible for individual risk assessments. Mr. Ferryman, Ms. McConkey, Mr. Jones, and Mr. Kunreuther will revise this recommendation and present the revised recommendation to the Council on October 21, 2015.

2015 Annual Report Draft Recommendation No. 15: *FEMA should leverage all opportunities to frame and communicate messages to stakeholders in communities so they understand the importance of addressing the flood risk today and consider long-term resilience strategies. Messages should be complemented by economic incentives such as low-interest loans and mitigation grants that lead community leaders and individuals to undertake cost-effective risk reduction measures.*

Mr. Kunreuther motioned for adoption of the recommendation. Mr. Mason suggested removing the word "all" and participants agreed. The motion was seconded and approved by the Council, as amended.

2015 Annual Report Section 4-6 – Data Management and Distribution

2015 Annual Report Draft Recommendation No. 16: *FEMA should transition from the current panel-based cartographic limitations of managing paper maps and studies to manage NFIP data to a database derived, digital display environment that are fully georeferenced and relational, enabling a single digital authoritative source of information and database-driven displays. Towards this transition FEMA should:*

a) Prepare a multi-year transition plan to strategically transition all current cartographic and/or scanned image data to a fully georeferenced, enterprise relational database.
b) Update required information for map revisions (MT-2 forms) and LOMC applications to ensure accurate geospatial references, sufficient data to populate databases, and linkages to existing Effective data.

c) *Adopt progressive data management approaches to disseminate information collected and produced during the study and revision process, including LOMCs.*
d) *The data management approach should be flexible to allow efficient integration, upload, and dissemination of NFIP and stakeholder data (e.g., mitigation and insurance data that is created and maintained by other Federal agencies), and serve as the foundation for creating all digital display and mapping products.*
e) *Provide a mechanism for communities to readily upload jurisdictional boundary data as it is revised, allowing other stakeholders access.*

Mr. Richard Butgereit, TMAC member, motioned for adoption of the recommendation and Ms. Durham seconded the motion. Ms. McConkey asked for clarification on what "enterprise" meant. Mr. Mark DeMulder, TMAC member, responded that it just describes the organization. Mr. Butgereit had a question about sub-bullet, "e)," regarding jurisdictional boundaries and asked what the frequency of the revision would be. It was noted that revisions would be as needed, per Title 44 Code of Federal Regulations (CFR). The sub-bullet was revised to read "Provide a mechanism for communities to readily upload jurisdictional boundary data, consistent with requirements to participate in the National Flood Insurance Program (NFIP), as revised, allowing other stakeholders access." The motion was approved by the Council.

A motion was made, and seconded, to adopt recommendations 10, 11, 12, 13, 15, and 16 from 2015 Annual Report sections 4-4, 4-5, and 4-6, as amended. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There were no comments from the public. Following the public comment period, Mr. Dorman called for a vote to adopt Recommendations 10 through 16 from 2015 Annual Report sections 4-4, 4-5, and 4-6, as amended, which the TMAC members unanimously adopted.

2015 Annual Report Section 4-7- Federal Partner Collaboration

2015 Annual Report Draft Recommendation No. 17: *FEMA should consider National Academy of Public Administration recommendations 6, 7, 8, 9 and 13 and use them to develop more detailed interagency and intergovernmental recommendations on data and program related activities that can be more effectively leveraged in support of flood mapping.*

Ms. Byler motioned to adopt the recommendation and Mr. Kunreuther seconded the motion. Mr. DeMulder commented that National Academy of Public Administration (NAPA) recommendation 15 needs to be added to the list and the last part of the last sentence should say "floodplain." Mr. Dorman commented that "flood mapping" was a broad definition. The Council discussed revisions to this phrase and concluded that it should say "flood mapping." Participants asked if there needs to be clarification on what the recommendation numbers correspond to. Ms. Byler responded that the numbers are described in the text. TMAC members questioned if this recommendation was intended for FEMA or TMAC, and the members determined it was meant for FEMA. The motion was approved by the Council, as amended.

2015 Annual Report Draft Recommendation No. 18: *FEMA should work with Federal, State, and local agencies, particularly the U.S. Geological Survey and the National Ocean Service, to ensure the availability of the accurate water level streamflow data needed to map flood hazards.*

Mr. Kunreuther made a motion to adopt the recommendation and Mr. Mallory seconded the motion. The Council commented that there the word "and" was missing between "water level" and "streamflow data" and that the recommendation should include "tribal" after "Federal, State." Mr. Mason requested an additional sentence to say, "Additionally, FEMA should collaborate with USGS to enhance the National Hydrography Dataset to better meet the scale and resolution needed to support local floodplain mapping while ensuring a consistent national drainage network." The motion was approved by the Council, as amended.

2015 Annual Report Section 4-8 – Cooperating Technical Partners

2015 Annual Report Draft Recommendation No. 19: *FEMA should develop and implement a suite of strategies to incentivize communities, non-government organizations, and private sector stakeholders to increase partnering and subsequent contributions for flood hazard risk updates and maintenance.*

Mr. Mallory made a motion to adopt the recommendation, which Mr. Ferryman seconded. Ms. Durham suggested including "and" to say "flood hazard and risk." The motion was approved by the Council, as amended.

2015 Annual Report Draft Recommendation No. 20: *FEMA should work with cooperating technical partners (CTPs) to develop a suite of measures that communicate project management success, competencies, and capabilities of CTPs. Where CTPs demonstrate appropriate levels of competencies, capabilities and strong past performance, FEMA should further entrust additional hazard identification and risk assessment responsibilities to CTPs*.

Ms. Durham made a motion to approve the recommendation. The motion was seconded and approved by the Council without further discussion.

2015 Annual Report Draft Recommendation No. 21: *FEMA should to ensure strong collaboration, communication and coordination between FEMA and its CTP mapping partners, FEMA should establish a National Flood Hazard Risk Management Coordination Committee. The role of the committee should be focused around the on-going implementation of the 5-year Flood Hazard Mapping and Risk Assessment Plan. FEMA should add other members to the committee that have a direct bearing on the implementation of the plan*.

Mr. Mallory made a motion to adopt the recommendation, which Ms. Durham seconded. The motion was approved by the Council without further discussion.

2015 Annual Report Section 4-9 – Maintenance and Funding

2015 Annual Report Draft Recommendation No. 22: *FEMA should provide recurring funds to ensure that all inventoried flood studies are assessed every 3 years, and if appropriate, updated prior to reaching a 5-year shelf life. Recurring funds should also ensure that new flood studies are performed on flooding sources where there is anticipated or ongoing development patterns.*

The Council discussed whether to incorporate future conditions in this recommendation as a way to evaluate when flood studies need to be updated. Mr. Gale Fraser, TMAC member, made a motion to the Council recommending the "Federal Government provide sufficient funding." Mr. Butgereit countered, recommending the Council say "FEMA should provide sufficient funding." Mr. Godesky reminded the Council that the legislation says the recommendations are going to the FEMA Administrator, not the Federal Government. Ms. McConkey suggested removing the word "funding," so that FEMA can take this to Congress to request funding. She suggested rewording the recommendation to say "FEMA should evaluate all effective studies every three years" and delete the last sentence. Ms. Durham countered by saying that this recommendation is intended to set aside money for studies and it is important include the significant funding language. Mr. Dorman suggested changing the recommendation to read, "FEMA should define the financial requirements to implement the TMAC's recommendations and to maintain its investment in the flood study inventory." Mr. DeMulder motioned to adopt the suggested language by Mr. Dorman. The motion was seconded and adopted by the Council, as amended.

2015 Annual Report Draft Recommendation No. 23: *FEMA should endorse the President's proposed 2016 Budget Request of $400 million for the Flood Hazard and Risk Assessment Program*.

Mr. Rodriguez motioned to delete this recommendation, which was seconded. Mr. Mallory explained that the reason for this recommendation was that funding levels have not been adequate in previous years, only what has been authorized in the bill. The Council agreed to delete this recommendation.

Mr. Dorman motioned to adopt recommendations 17-22, as amended, from 2015 Annual Report sections 4-7, 4-8, and 4-9. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There were no comments from the public. Following the public comment period, Mr. Dorman called for a vote on recommendations 17 through 22, as amended, from 2015 Annual Report sections 4-7, 4-8, and 4-9, which the TMAC members unanimously adopted.

Public Comment Period

Mr. Godesky announced that, per FACA, members of the public are provided the opportunity to provide oral and written comments on the issues to be considered by the TMAC. Mr. Godesky requested that speakers limit their public comments to no more than three minutes and said that the public comment period will not exceed 30 minutes. While the public was offered the opportunity to speak, no comments were received.

2015 Annual Report and Future Conditions Report Narrative – Adoption

2015 Annual Report

Foreword

Ms. McConkey motioned to add a paragraph in the Foreword referencing the Future Conditions report. Mr. Jones commented that "flood hazard risk" should be separated out to read "flood hazard and risk" or just "flood risk." Ms. Durham motioned to adopt both additions. The motion was seconded and approved by the Council, as amended.

2015 Annual Report Section 1 – Introduction

Ms. McConkey requested a correction on language, noting that the national flood mapping program was created, not reauthorized. Mr. Butgereit noted that the reports also refer to the national flood mapping program as the NFIP mapping program, and that the TMAC should be consistent with its terminology. Mr. Kunreuther requested mentioning any changes to the TMAC charge made by HFIAA legislation. Members discussed various formatting changes and noted changes needed to ensure consistency throughout and between the two reports. There was a motion to approve this section. The motion was seconded and approved by the Council, as amended.

2015 Annual Report Section 2 – Background

Members discussed section 2 and its subsections, 2.1 *The National Flood Insurance Program*, 2.2 *Flood Hazard Identification*, and 2.3 *Flood Map Modernization and Risk MAP*. Ms. Shirley commented that there is a requirement to maintain flood insurance if federal grants are given to a building or individual assistance awarded to the homeowner. Mr. Jones commented that there are a lot of flood zones that are not mentioned and requested including a standard table from FEMA that lists all the zones. In section 2.2.3, *Zone A*, Coastal Zone A and Coastal A Zone have different meanings and need to be differentiated. He noted that the section's narrative implies that Zone A is model based, which is misleading. Hydrologic model should not be conflated with statistical models. Participants said that there are some inaccuracies regarding the zones in both the Future Conditions Report and the Annual Report, and Mr. Dorman assured the Council that both reports will be checked and corrected as needed. Mr. Jones commented that on the Pacific coast, there is a fifth criteria (depth and velocity combination) and that section 2.3 should indicate that Zone A is specific for Pacific coast only. A member noted that the word "quality" is used in two different ways in the report and should be removed in section 2.3, *Flood Map Modernization and Risk MAP*. Ms. Grassi discussed section 2.3.2.2, *Performance Measures*, which discusses quality data only relevant for riverine environments, and asked if that included coastal in terms of quality measure. Mr. Rodriguez suggested saying "flood hazard miles" instead of "riverine miles." There is a motion to adopt the section 2, *Background*, of the 2015 Annual Report with the understanding

that the edits and amendments discussed will be incorporated. The motion was seconded and approved by the Council, as amended.

Adjournment

Mr. Godesky thanked participants for their discussion and announced that the TMAC meeting will reconvene at 8:00 a.m. on October 21, 2015.

Day 2: October 21, 2015

Call to Order/ Roll Call

Mr. Godesky opened the meeting with a facilities reminder and a TMAC member roll call. He then turned the meeting over to Mr. Dorman, who reviewed the agenda and reminded the members that the technical editors will walk the members through the report narrative today. Additionally, he encouraged everyone to only be concerned about substantial content issue.

Revised Recommendations

Mr. Dorman discussed two revised recommendations from yesterday's meeting, 2015 Annual Report draft recommendation 14 and Future Conditions Report recommendation 7, sub-recommendation 4-15.

2015 Annual Report Section 4-5 – Flood Risk Assessment and Communication

2015 Annual Report Draft Recommendation No. 14: *FEMA, and its mapping partners including the private sector, should adopt a flood risk assessment focus that is structure specific. It should be noted that flood hazard identification is an essential component in performing flood risk assessment and must be performed prior to any flood risk assessments. However, to advance preventive and mitigating strategies and as well as support loss estimations for insurance rating purposes, flood risk assessments should be the focal point. Towards this new focus:*

e) FEMA should establish an Implementation Plan for Structure-Specific Flood Risk Assessments;
f) FEMA should initiate dialogue with risk assessment stakeholders to define structure-specific risk assessment products, displays, standards, and data management;
g) FEMA should draw from and leverage partners and programs successfully performing risk assessments; and
h) Where data exists that appropriately supports structure-specific risk assessments or can be leveraged from partners, FEMA should accommodate and support such structure-based risk assessments.

Mr. Ferryman presented revised recommendation 14 to the Council for review, and made a motion to adopt the recommendation as amended, which Mr. Dorman seconded. Mr. Kunreuther said that he felt that this was an improvement as the recommendation recognizes the importance of FEMA working with its mapping partners. The recommendation was adopted, as amended, by the Council, as follows:

> *Recommendation No. 14: FEMA, and its mapping partners including the private sector, should transition to a flood risk assessment focus that is structure specific. Where data are available, FEMA and its partners should contribute information and expertise consistent with their interest, capabilities and resources towards this new focus.*

a) *A necessary prerequisite for accurate flood risk assessments is detailed flood hazard identification, which must also be performed to advance mitigation strategies and support loss estimations for insurance rating purposes.*
b) *FEMA should initiate dialogue with risk assessment stakeholders to identify potential structure-specific risk assessment products, displays, standards, and data management protocols that meet user needs.*
c) *FEMA and its partners should develop guidelines, best practices, and approaches for implementing structure-specific risk assessments.*

Future Conditions Report Draft Sub-Recommendation 4-15: *Develop better risk assessment tools that evaluate future risk, both population-driven and climate-driven, for example, improve integration of Hazus with land use planning software designed to analyze and visualize development alternatives, scenarios, and potential impacts to increase use in local land use planning.*

The Council discussed the deletion of sub-recommendation 4-15 in the Future Conditions Report. Mr. Ferryman commented that he thought the sub-recommendation was removed because it was outside of the scope of the TMAC's legislative mandate. Mr. Mallory motioned to reinstate the sub-recommendation into the report, which Ms. Lathrop seconded.

Mr. Mallory offered perspective from a local government point of view, noting it would be beneficial for local planners and elected officials to have time to understand the consequences of the land use decisions they make, and if a proposed development is to be built, they need to know the cost associated. Ms. Durham motioned to remove the words "for example" from the sub-recommendation and Mr. Edelman requested adding in "FEMA should" at the beginning. Mr. Jones suggested replacing "Hazus" with "hazards and loss estimation models." Mr. Mallory agreed to move forward with the amendments and made a motion to approve, which Mr. Dorman seconded. The recommendation was adopted, as amended, by the Council, as follows:

4-13 FEMA should develop better flood risk assessment tools to evaluate future risk, both population-driven and climate-driven. Improve integration of hazard and loss estimation models (such as HAZUS) with land use planning software designed to analyze and visualize development alternatives, scenarios, and potential impacts to increase use in local land use planning.

Mr. Dorman turned the meeting over to Mr. Edelman to discuss the Future Conditions Report narrative.

2015 Annual Report and Future Conditions Report Narrative – Adoption

Future Conditions Report

Mr. Edelman provided an overview of how the comments were organized. He said that the significant comments or needed changes were highlighted in the document. Mr. Edelman asked the members to review the section and suggest changes if needed. Mr. Dorman reminded the group that section 1, *TMAC Charter*, of the 2015 Annual Report was approved on October 20, 2015. He explained that there are several identical items in section 1, *Introduction,* of the Future Conditions Report, and that since the language was already approved in the 2015 Annual Report, it will not need to be approved, again. Mr. Dorman said that the Council will need to approve the narrative specific to the Future Conditions Report.

Future Conditions Report Section 2 – Background

Mr. Edelman discussed of section 2, *Background*, noting that the changes made to the 2015 Annual Report will be reflected in the Future Conditions Report. Ms. Grassi commented that the narrative is not the same as the 2015 Annual Report and will require more than a technical edit. Mr. Rodriguez inquired as to the expectation for further review of the reports following the meeting. Mr. Dorman encouraged the Council to make comments now with the understanding that their changes will be incorporated.

Ms. McConkey expressed concern over approving and adopting the reports in this meeting due to significant changes made, and requested to have a sign-off from lead authors.

Mr. Dorman informed the Council that they will be conducting a virtual public meeting, but the requirement of a publishing a Federal Register Notice prior to the meeting would extend the report submission by six weeks. Mr. Godesky outlined the options the Council has going forward for submitting the reports, and the FACA guidelines they must abide by. He offered the option of delivering a report with only the recommendations to the FEMA Administrator, with a full report that includes the narrative at a later date.

Mr. Edelman commented that the sections only require technical editing. Ms. Durham believes that with the identified lead authors, a technical edit could be achieved in a couple of days. Mr. Mallory noted that he is in favor of 'adopting this as amended', so that mistakes, such as incorrect statements on flood zones, can be fixed. Mr. Dorman offered the option of delivering the Executive Summary and recommendations to the Administrator. Then, when the Council meets in December it could review and vote on the full narrative of both reports. Mr. Godesky noted that Mr. Dorman's option would satisfy delivering the 2015 Annual Report on time. Ms. Durham asked if the Executive Summary would be submitted as the report, making the full report with narrative an appendix to the report, and Mr. Godesky confirmed. Members asked for clarification on the implication of delivering the reports late. Mr. Godesky explained that the Council had one year from when the TMAC was stood up to deliver the reports. The TMAC has already moved the deadline from October 1, 2015, to October 31, 2015, and it would be difficult to explain a further delay. He noted that the key to Mr. Dorman's suggestion is that the reports can be delivered on time, and the context can be provided later.

The Council continued to deliberate what parts of the reports were critical for delivery on time, such as section 1, *TMAC Charter*, the report recommendations, and TMAC activities. Mr. Dorman suggested submitting the suggested sections as the "2015 Annual Report – Interim" and submit the final report with the narrative as the "2015 Annual Report." Mr. Godesky clarified that FACA and the DHS Committee Management Office do not have a requirement based on the deadline for the reports, and the reports will be filed into the FACA database when the Council delivers them. The October 2015 deadline is what is required by BW-12, but in order to meet the requirement, the report just needs to describe the TMAC activities for the year.

Ms. Lathrop commented that the Executive Summary is not ready, and made a motion to present the 2015 Annual Report section 1*, TMAC Charter,* recommendations (as adopted in October 2015 TMAC Meeting), list of SME presentations and list of TMAC meetings (from the 2015 Annual Report Appendix) as the TMAC's Interim 2015 Annual Report to the Administrator of FEMA on the annual activities of TMAC, with the supporting statements and documentation as our full reports, along with Executive Summaries for each full report to be approved for release at the TMAC's December meeting. Mr. Dorman seconded the motion. The motion was approved by the Council.

The Council members discussed the possibility of combining both reports for a single Interim Report. Ms. Shirley requested separating out the 2015 Annual Report and the Future Conditions report with the belief that there is a possibility of completing the Future Conditions report on time.

Future Conditions Report Section 5 – Approaches for Future Conditions Calculations and Mapping

Mr. Edelman transitioned the discussion back to reviewing the Report narrative and asked Members to make comments on section 5*, Approaches for Future Conditions Calculations and Mapping*.
Mr. Ferryman commented on section 5.2.2.2, *Risk Framing*, and asked the Council if they would like to limit the discussion to Cooperating Technical Partners (CTPs) or if they would consider changing the narrative to say "communities" instead. Ms. Shirley agreed with Mr. Ferryman's edit and made a motion to revise. Mr. Ferryman seconded and the Council approved the motion.

Mr. Mason motioned to amend the first sentence of section 5.3, *Best Available Riverine Science*. The sentence reads, "Defining future riverine flood hazards requires an assessment of future hydrologic and

land use change that will influence the frequency and magnitude of extreme precipitation events" and Mr. Mason motioned to change the first part of the sentence to future "climate, hydrology, and land use that." Mr. Edelman said that the amended statement now reads as if the section discusses three separate topics, but the section is only about the two originally stated in the sentence. He continued that it might confuse the reader to separate out the three. Mr. Mason withdrew his motion. Mr. Ferryman made a motion to adopt section 5, as amended, which Mr. Butgereit seconded. The motion was seconded and adopted by the Council as amended.

Future Conditions Report Section 6 – Considerations for Future Conditions Mapping Impacts
Mr. Edelman noted that he received numerous comments on this section since the last TMAC meeting and they have been incorporated. He opened the floor to comments and questions from the Council. Hearing none, Mr. Ferryman motion to adopt section 6, which was seconded by Ms. Lathrop. The Council unanimously adopted the motion.

Future Conditions Report Section 3 – Future Conditions and Changes in the Floodplain

Mr. Mallory stated that two photos in figure 3-1, which shows channel changes on Vermont Route 107 resulting from Hurricane Irene and changes after flash flooding at the in Colorado, had the descriptions backwards and requested that they are fixed in the technical editing process. Mr. Kunreuther commented that there is an opportunity to make sub- recommendation 3.7, "FEMA should publish multiple future conditions flood elevation layers that incorporate uncertainty so as to provide a basis for building designs that lower flood risk" stronger by highlighting the 0.2% elevation. Mr. Ferryman made a motion to adopt section 3, as amended, and the motion was seconded. The motion was adopted by the Council, as amended.

Mr. Dorman motioned to adopt Future Conditions Report sections 3, 5, and 6, as amended, and it was seconded. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There were no comments from the public. Following the public comment period, Mr. Dorman called for a vote on Future Conditions Report sections 3, 5, and 6, with amendments as discussed in the meeting today, which the TMAC members unanimously adopted.

Future Conditions Report Section 4 – Information Needed to Incorporate Future Conditions

Mr. Mallory reviewed section 4, *Information Needed to Incorporate Future Conditions,* and noted that most of 4.1, *Topographic Data Needs*, is covered in the 2015 Annual Report. Ms. McConkey commented that the last sentence in Section 4.1.3, *Hydrography & Watershed Boundaries Datasets*, should be changed to match the 2015 Annual report. She also asked for clarification on section 4.3.2, *Rainfall Gages*, regarding what standard language to use for rainfall gages. Ms. McConkey commented that the last sentence in section 4.3.3, *Stream Gages*, should include "added additional sites," and Mr. Edelman responded that the notion of adding additional gages is a 2015 Annual Report issue. Ms. Blackwell suggested adding more information under section 4.1, *Topographic Data Needs*. She said that it would be useful to add a statement similar to the 2015 Annual Report that FEMA should invest in LIDAR standards and the national coastal mapping strategy to include coastal mapping strategy in addition to the 3D Elevation Program (3DEP).

Mr. Ferryman suggested revising the second sentence of the last paragraph in section 4.3.8, *Community Land Use Plans*, to say FEMA "and States" have planning specialists, as States put a lot of time and effort into assisting communities. Ms. Byler pointed out to the members that this section is supposed to support recommendation 7 but does not see any language to support future conditions. Mr. Edelman noted that the overall recommendations are pulled from several chapters.

Mr. Ferryman discussed section 4.3.7, *Estimating Future Conditions Coastal Analyses*, and expressed concern about discussion on housing close to shore lines and how that could be interpreted, as it precedes the section on community land use plans. Mr. Ferryman motioned to delete the note of caution, which reads, "A note of caution, however: housing tends to reduce wave hazards landward of the development, when compared to open space, as houses closest to the shore will absorb the wave energy

(potentially destroying them) thus "protecting" houses landward. Thus it is possible that construction of more houses in areas prone to damaging wave hazards could reduce the extent of the hazard even while increasing the overall risk." Ms. Lathrop offered alternate language to say "structures closest to the shoreline receive the most energy of the storm but provides protection to inland." Mr. Edelman reminded the members that this type of text is not needed to support the recommendations. Ms. McConkey suggesting revising the last sentence to say "because the houses on the front line protect those behind it, you should extend the strategy to the second layer houses" and consider mitigation options for those who do not appear to be in harm's way. Mr. Dorman instead motioned to delete the last sentence and the motion was seconded. Mr. Ferryman made a motion to adopt Future Conditions section 4, as amended. The motion was seconded and adopted by the Council.

Future Conditions Report Section 7 – Summary and Recommendations

Mr. Ferryman made a motion to adopt section 7, which was seconded. Several members expressed changes they would like to discuss. The Council discussed section 7.4, *Considerations for Future Study*, which identifies some of the issues that need to be considered if future conditions data are added nationally to the program.

Mr. Jones suggested changing the description of the rate of future change implications issue, to "consider rates of future conditions changes and determine appropriate planning time arises" and the description of the maintenance of future conditions maps issue to "consider the cost of adding and maintaining the future conditions information to the NFHL." Mr. Rodriguez suggested there could be a conflict in stating that, as the NFHL is considered regulatory. Mr. Jones suggested changing NFHL to "maintenance of future conditions maps" instead.

Ms. Grassi, continuing the discussion on the regulatory versus non-regulatory, pointed out that there seems to be inconsistencies in the report regarding this topic. Sub-recommendation 5-12, says "Maps displaying the location and extent of areas subject to long-term coastal erosion and future sea level rise scenarios should be advisory (non-regulatory) for Federal purposes. Individuals and jurisdictions can use the information for decision-making and regulatory purposes if they deem appropriate," but section 7.1, *Purpose*, says the focus of the reports is how the future conditions should be calculated, not if the information is regulatory.

Ms. Shirley discussed the future conditions implication to mitigation grants issue and said that the Council appears to be making an assumption in the description, and should change it to say, "Consider how mitigation can be linked to grants." Mr. Ferryman agreed.

Ms. Lathrop commented on the future conditions roll-out issue, noting that it is not clear what the program the future conditions will be rolled out to. Mr. Edelman followed-up on Ms. Lathrop's considerations and suggested rephrasing the description to consider how future conditions data will be released to the stakeholders.

Ms. Shirley commented on the implications to CRS and floodplain management issue and suggested modifying it to say "how would CRS be modified to support future conditions" and change the issue to "CRS Modifications to Support Future Conditions." Ms. Durham suggested changing "support" to incorporate, and Ms. Shirley agreed. Mr. Ferryman accepted the modifications to the motion.

Mr. Rodriguez requested clarification on the way regulatory is being used and whether it refers to the mandatory purchase of insurance versus saying non-regulatory as plain flood hazard data. Ms. Grassi asked if "for Federal purposes" needed to be specified. She continued that sub-recommendation 5-12 is non-regulatory for Federal purposes but can be used as regulatory locally, if necessary. Ms. Grassi commented that if a recommendation is to be made, it should be non-regulatory. The motion to adopt section 7 was seconded by Mr. Dorman. The motion was approved by the Council to adopt section 7, as amended.

Future Conditions Report – Executive Summary

Mr. Dorman requested a review of the first two pages of the executive summary. Members discussed the line, "The holy grail of flood mitigation and floodplain management is reduced loss of life and reduced annualized losses" and suggested more appropriate ways of phrasing "holy grail"; suggestions included using "goals" or "objectives."

Mr. Ferryman recommended adopting the Executive Summary if the Council agrees on the layout and that there needs to be more work on the narrative and transition between paragraphs. Ms. Blackwell recommended striking the whole first paragraph as the text also appears in section 4, *Information Needed to Incorporate Future Conditions*, and section 7.5, *Closing Remarks*. She noted that the focus should be opening the report with a true summary of what the Council is recommending in the report.
Ms. McConkey suggested adopting the report, but not the Executive Summary, and Mr. Ferryman agreed. Ms. Grassi agreed and also motioned to change the paragraph duplicated in section 7.5, *Closing Remarks*. The motion was seconded and approved by the Council. Additional comments on the Executive Summary included Ms. Lathrop's motion to remove all references to E Zones. Ms. Blyler motion to include more language from section 5, *Approaches for Future Conditions Calculation and Mapping*, regarding future conditions, sea level and climate change, to support discussion of recommendation 7 in the Executive Summary. Both motions were seconded and adopted by the Council.

Future Conditions Report Section 1 – Introduction

Mr. Fraser commented that this section should be the same as 2015 Annual Report section 1, already adopted by the Council, and made a motion to adopt. Mr. Mallory commented that there is one change in the "Purpose" section. Mr. Fraser withdrew his motion. Ms. Durham made a motion to incorporate the edits adopted for 2015 Annual Report Section 1 into the Future Conditions Report section 1. The motion was seconded. Mr. Ferryman made a motion to adopt as amended. The motion was seconded and adopted by the Council.

Mr. Dorman made a motion to adopt Future Conditions sections 4, 7 and 1, and the motion was seconded. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There was one comment from the public.

Mr. David Conrad, Water Resources Policy, made the following comment:

> *This comment is about things that will happen in the future. This has to do with following up on the discussion of 4.3.7. I understand why the council has opted to drop the sentences at the end of the section but I encourage the council to not drop how wave modeling is done. Should FEMA possibly consider identifying some other, for instance identifying B zones, I suggest such questions may not be fully understood today but I suggest it be deferred for future consideration.*

Following the public comment period, Mr. Dorman called for a vote on Future Conditions Report sections 4, 7, and 1, as amended by the Council, which the TMAC members unanimously adopted.

Future Conditions Report Section 2 – Background

Mr. Fraser motioned to delete section 2, *Background*, from the Future Conditions Report and leave it in the 2015 Annual Report. Mr. Crowell, said that the section is fundamental to the report. Ms. McConkey agreed and the Council agreed to reconcile the differences between section 2 is both reports and discuss what changes are needed.

Ms. McConkey discussed the various zones referenced in the footnotes and suggested moving the information to the narrative. She also noted the need for a more accurate definition of X Zones, and the difference between Zone X and Shaded Zone X. Mr. Dorman questioned if it is important to include detailed information on zones in the Background Section of the report, and suggested moving this information to an appendix. Mr. Jones stressed the importance of zone information, stating the zones migrate when conditions change, which changes flood insurance rates, and people need to understand

why flood zones change. Members agreed that the narrative on zones should be kept in the body of the report. Mr. Jones and Mr. Crowell agreed to work through this section and ensure the correct zone information is included.

Mr. Butgereit motion to remove the last sentence in 2.5.13, *The Homeowner Flood Insurance Affordability Act (2014)*, which states, "The law also requires FEMA to submit the TMAC review report to Congress" as it is irrelevant to the Future Conditions Report. Mr. Dorman motioned to adopt section 2, as amended, clarifying that Mr. Jones will amend sections 2.1.2, and 2.5.1, regarding the definition of flood and flood zone descriptions. The motion was seconded and adopted by the Council.

Ms. Grassi noted that the Council adopted section 7, but subsection 7.5, *Closing Remarks,* is a repeated paragraph, and questioned what the process is for changing this section now that is has already been adopted. Ms. Shirley motioned to delete section 7.5. The motion was seconded and adopted by the Council. Mr. Dorman motioned to adopt re-adopt section 7 with the new revisions, which was seconded and adopted by the Council. Mr. Dorman stated that the issue brought forward regarding the duplicated paragraphs also affects the opening paragraph of the Executive Summary and section 4, *Information Needed to Incorporate Future Conditions,* and asked the Council who will rewrite the opening paragraph for the Executive Summary. Mr. Ferryman motioned to charge the Future Conditions Subcommittee with rewriting the Executive Summary, which was seconded and adopted. Mr. Dorman noted that the Council will review the rewritten Executive Summary at the December TMAC meeting.

Future Conditions Report Section 8 – Glossary

Ms. Lathrop said that the Future Conditions Report does not include an acronym list like in the 2015 Annual Report, and suggested including a list in the glossary. Ms. Shirley noted several glossary terms are unrelated to the Future Conditions Report and suggested the technical editors ensure that appropriate the terms appear in the glossary. Mr. Jones commented that the definitions for flood hazard and flood risk need to be consistent with the 2015 Annual Report, as discussed in the previous day's meeting.
Mr. Ferryman made a motion to adopt section 8, *Glossary*, which amendments. Ms. Lathrop amended the motion to separate out the glossary and acronyms into two subsections, and Mr. Ferryman accepted the amendment to his motion. The motion was adopted by the Council.

Future Conditions Report Section 9 – References

Ms. McConkey motioned to change section 9, *References*, to "References and Bibliography," which was seconded. The Council voted to adopt section 9, as amended.

Mr. Dorman motioned to adopt Future Conditions Report sections 2, 8, and 9, as amended, which was seconded. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There were no comments from the public. Following the public comment period, Mr. Dorman called for a vote on Future Conditions Report sections 2, 8, and 9, as amended by the Council, which the TMAC members unanimously adopted.

Future Conditions Report Section 10 – Appendix

Mr. Dorman noted that the technical editors will ensure that all SME presentations for subcommittee meetings will be captured in the appendix. He made a motion to adopt section 10, *Appendix*, as amended with changes from the technical editors. The motion was seconded and adopted by the Council, as amended. Mr. Dorman noted that all sections of the Future Conditions Report have been adopted, with the exception of the Executive Summary. The Council will review and adopt the Executive Summary along with the full report during the December TMAC meeting.

2015 Annual Report

Ms. Durham led the Council in a discussion of 2015 Annual Report section 4, *2015 Topics and Recommendations*. Each topic in the section includes an issue discussion, topic background, issue analysis, key findings, and recommendation.

2015 Annual Report Section 4.7 – Federal Partner Collaboration

Mr. Mason noted that a changes have been made to this section and as a result, new supporting information will need to be incorporated. Ms. Blackwell added that key points will also need to be incorporated. Mr. Butgereit mentioned that he has proposed narrative to add in 4.7.2.1, *National Datasets*, on the national hydrography dataset, pulled from the Future Conditions Report. A motion was made, and seconded, to adopt section 4.7 with the changes to be made, which the Council adopted.

2015 Annual Report Section 4.8 – Cooperating Technical Partners (CTPs)

Participants discussed section 4.8, *Cooperating Technical Partners (CTPs)*. Ms. McConkey asked if the CTP Program was still considered a pilot program. Ms. Grassi asked for verification on the standard categories for Mapping Activity Statements (MAS) and noted she believes that Community Engagement Risk Communications (CERC) should be added as the fifth category. Participants provided several additional comments, including

- "CTP Collaboration Site/Mentoring" is missing a description and is listed as a requirement for funding, which may not be true.
- The glossary definition of CTP is outdated and should be reworded.
- Section 4.8.1.3 is titled "Measuring Success of the CTP Program," but the content of the section regards evaluating CTP performance. This section title should be reworded to reflect the content.

Ms. Durham motion to adopt section 4.8, as amended. The motion was seconded and adopted by the Council.

2015 Annual Report Section 4.9 – Maintenance and Funding

Ms. Shirley commented about the report as a whole, noting that the term "base map" is used indiscriminately throughout the report and needs to be updated to differentiate between what is used for terrain data versus what is used for display.

Mr. Rodriguez offered to provide an updated percentage of the map inventory that is considered New, Validated, or Updated Engineering (NVUE)-compliant. Ms. Grassi noted that this section only covers riverine mapping and questioned whether there is a gap in the information provided regarding the scope of activity. The Council agreed that the section needs to clarify that it covers riverine mapping and does not reflect FEMA's coastal inventory. Ms. Durham motioned to adopt section 4.9, as amended, which was seconded and adopted by the Council.

Mr. Dorman motioned to adopt 2015 Annual Report sections 4.7, 4.8, and 4.9 narratives presented in the 2015 Annual Report with changes approved by the Council. The motion was seconded. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There was one comment from the public.

> David Conrad, Water Resources Policy, provided the following comment:
>
> *I have spent a lot of time in my career thinking about how things get accomplished through budgets. I know recommendation twenty-three was removed from the recommendations, if this council has an idea of what level of magnitude this would have, then having some kind of recommendation on this would be useful to include.*

Following the public comment period, Mr. Dorman called for a vote on 2015 Annual Report sections 4.7, 4.8, and 4.9 narratives presented in the 2015 Annual Report with changes approved by the Council, which the TMAC members unanimously adopted.

2015 Annual Report Section 4.4 – Flood Hazard Identification – Production Processes

Participants discussed section 4.4, *Flood Hazard Identification,* noting that:

- Section 4.4.1.1, *Identifying, Mapping, and Regulating to the 1-percent-Annual-Chance Floodplain Boundary*, is written from the riverine perspective and needs to be specified as such, or changed to be more generically written.
- Verification is needed on the length of time the Key Decision Point (KDP) process adds to the study timeline. This information can be verified from a SME Presentation.
- The key finding regarding the LOMA process and its associated cost needs to be updated to reflect survey costs.

Ms. Durham motioned to adopt section 4.4, as amended. The motion was seconded and the section was adopted by the Council.

2015 Annual Report Section 4.5 – Flood Risk Assessment and Communication

Mr. Jones commented that his sections on Flood Risk Assessment will need to be updated to reflect the revision to recommendation 14, and he will work with Mr. Ferryman to update it. Ms. Shirley pointed out a paragraph in section 4.5 is duplicated in section 4.5.2, and members agreed to remove the duplication. Ms. Durham motioned to adopt section 4.5 as amended. The motion was seconded and was adopted by the Council.

2015 Annual Report Section 4.6 – Data Management and Distribution

Mr. Butgereit discussed changes he made to section 4.6, *Data Management and Distribution*. He removed the section on the National Geospatial Platform, geoplatform.gov, as the platform does not include a lot of FEMA data, and other sections were more relevant to the section topic. Mr. Butgereit also suggested changing the title of the section to "Data Distribution and Management."

Ms. Shirley noted that a figure in section 4.1 that shows how different products and data display mechanisms affect the cartographic base map and impact the decisions made about the intersection of flood hazards and the built environment should be moved to section 4.6. The Council agreed to move it the illustration to this section. Ms. Durham motioned to adopt section 4.6 as amended. The motion was seconded and the section was adopted by the Council.

Mr. Dorman motioned to adopt the 2015 Annual Report sections 4.4, 4.5, and 4.6 narratives presented in the 2015 Annual Report with changes approved by the Council. The motion was seconded. Mr. Godesky announced that members of the public were invited to provide comments on the issues considered by the TMAC. There were no comments from the public. Following the public comment period, Mr. Dorman called for a vote on the 2015 Annual Report sections 4.4, 4.5, and 4.6 narratives with changes approved by the Council, which the TMAC members unanimously adopted.

Annual Report Section 4.1 – Community of Users and Uses

Ms. McConkey led the discussion on section 4.1*, Community of Users,* and changes that have been made to the section. She noted that the sections under 4.1.1, *Users, Uses and Products,* do not lend themselves to individual issue analyses, and 4.1.2, *Summary of User Needs,* will summarize the issue analysis for all users. Ms. Grassi asked for clarification on the paragraph titled "Versioned," noting that there has to be versioning with flood mapping products in order to support grandfathering. Ms. Shirley agreed to work on revising the text for clarification.

Ms. Shirley suggested inserting a paragraph on the history and transition to AE Zones for rate setting. Mr. Ferryman offered to work with Mr. Kunreuther to review the narrative on the National Research Council report on the role the NFIP could play in encouraging mitigation measures, to ensure this section is formatted like the rest of the report. Mr. Ferryman also noted there are many terms used to refer to the public, such as public at large and general public, and suggested using the term "public" consistently throughout the report.

Members discussed the General Summary of User Requirements table and noted that not all of the users listed in the table are discussed in the narrative. Mr. Jones and Ms. McConkey will work together to expand the text to better align to the listed users in the table. Mr. Jones suggested that the issue analysis section could be used to frame all of section 4.1. Mr. Jones will work with Ms. McConkey to frame section 4.1. Ms. Durham motioned to adopted section 4.1, as amended, which Mr. Butgereit seconded, and the Council adopted the motion.

2015 Annual Report Section 4.2 – Flood Hazard Identification – Program Goals and Priorities

Members discussed numbers and metrics in section 4.2*, Flood Hazard Identification – Program Goals and Priorities,* which need to be verified, including the updated NVUE information provided by Mr. Rodriguez. Ms. Grassi suggested softening the language regarding CTP input on prioritizing studies, as the current language suggests all CTPs do this, but it should say CTPs can provide input. A motion was made, and seconded, to adopt section 4.2 as amended. The Council adopted the motion.

2015 Annual Report Section 4.3 – Flood Hazard Identification – Core Data, Models and Methodology

Mr. Mason said that he developed additional narrative on water level data to be incorporated into section 4.3, *Flood Hazard Identification – Core Data, Models and Methodology*. Ms. Blackwell and Mr. Mason will work together to revise the introductory text to reflect the additional narrative, as well as add a key finding related to water level Data. Participants noted that "ground LiDAR" should be replaced with "terrestrial LiDAR" and the glossary should be updated accordingly. The Council discussed section 4.3.5.1, *One-Dimensional Unsteady and Two-Dimensional Models*, and agreed that the narrative on wave models should be moved to a coastal section, rather than under 4.3.5, *Riverine Hydraulics.* Ms. McConkey and Mr. Jones will work with Dr. Honeycutt to revise this section. A motion was made, and seconded, to adopt section 4.3. The Council adopted the motion.

Mr. Butgereit motioned to vote on sections 4.1, 4.2, and 4.3 for adoption into the 2015 Annual Report, which Mr. Mason seconded.

Public Comment Period

Mr. Godesky announced that, per FACA, members of the public are provided the opportunity to provide oral and written comments on the issues to be considered by the TMAC. Mr. Godesky requested that speakers limit their public comments to no more than three minutes and said that the public comment

period will not exceed 30 minutes. Mr. Godesky invited members of the public to make any additional comments.

Mr. David Conrad, Water Resources Policy, submitted the following comment:

To: Mike Godesky, et al.

Attached is an electronic copy of a paper I submitted this morning at the TMAC public comments session. The paper was originally prepared and submitted for the ASFPM Foundation's 2015 Gilbert F. White Forum, September 2015, held at George Washington University).

This paper emphasizes the importance of planning for the inclusion of critical natural resources data layers for purposes future "digital" flood hazards mapping to support all levels (federal, state, local, tribal and individuals) for their land use and floodplain management planning and decision making needs. This is particularly critical in the context of "future conditions" mapping -- especially in light of climate change, sea-level rise, urbanization, and changing watershed hydrology. I would observe that these issues were discussed more in the early months of TMAC meetings, than the past several months, and would urge that they be identified more explicitly in finalizing the current reports, and that this issue would be an important issue to receive greater attention in the next Annual Report (2016) and the further work of the Council.

Thank you,
David Conrad

Challenge for TMAC and FEMA: Climate-informed science mapping should incorporate natural resource values and impacts
David Conrad, Consultant, Water Resources Policy

Since the earliest beginnings of the National Flood Insurance Program (NFIP), there has always been some tension in the program between the level focus and attention placed on the provision, marketing, and management of NFIP flood insurance products and the attention levels given to risk mitigation and land use management aspects. Some of this tension has been probably been driven by the need for risk maps to meet rigorous technical standards – partly because they are often subject to legal challenge. At the same time, communities today require much more information, well beyond the location of where insurance purchases will be required, for their long-term planning and development and in the face of changing flood risks and environmental conditions.

It is becoming increasingly clear from climate science that now and in the future, changing risks of flooding will also pose substantial, and in some cases, profound impacts on basic environments, which not only may affect buildings and property and their insurability, but also the very character and potential uses and productivity of lands and their affected floodplain ecosystems. Thus, a broad question is what adjustments are needed in the NFIP to help and support the thousands of affected communities which are and will be navigating the changes and uncertainties of climate change, rising sea levels, eroding shorelines, and how do those adjustments get made?

Focus on digital mapping systems
Ultimately, to make effective decisions, communities will increasingly need more easily-integrated information for planning (including for land use), decision making, and policy setting. At least a substantial part of effective planning could be greatly facilitated through improved and integrated mapping systems, which should identify and characterize both present and future hazards, as well as environmental values and assets and how their performance will be affected into the future.
The Biggert-Waters legislation authorized FEMA to (re)establish the Technical Mapping Advisory Council (TMAC) and – as to future conditions risk assessment and modelling – directed the Council "to develop recommendations on how to ensure that flood insurance rate maps incorporate the best available climate science to assess flood risks"; and "ensure that FEMA uses the best available

methodology to consider the impact of – I) the rise in sea level and II) future development on flood risk." The first two reports from the Council are expected to be delivered sometime in October of this year. Biggert-Waters, in turn, authorizes and directs FEMA, in coordination with TMAC, to establish an ongoing, much enhanced national flood mapping program, including establishing standards for "use by State and local governments in managing development to reduce the risk of flooding," and "any other relevant information as may be recommended by the [TMAC]."

Having observed the series of the Technical Mapping Advisory Council (TMAC) public meetings since the Council began work September 30, 2014, I've developed the highest appreciation for the heroic efforts of this Council and for the daunting demands and scope of its charge, especially the difficult task of making recommendations for incorporating best available climate science into flood insurance rate maps – which, at this point, I believe the Council is ultimately focusing more on improving flood hazard risk identification and communication within the exploding field of digital-based formats, rather than the classic NFIP "rate maps." A basic first task for TMAC is to make recommendations to help direct the agency's flood risk mapping efforts to incorporate climate and future conditions, recognizing the many uncertainties, to meet needs of the insurance program.

The Biggert-Waters' direction, however, clearly presents a critically important opportunity to improve and expand the scope of GIS-based risk mapping beyond traditional boundaries and to employ an expanded range of disciplines, such as biology and ecology that will become even more relevant to resiliency in the future.

Early on a substantial area of TMAC discussion focused on both the mapping needs for the NFIP's "regulatory program" and the growing needs of communities and agencies at all levels for resource and hazard mapping for "non-regulatory" and planning purposes. Some of the greatest gains yet to be had may well be the expansion of what FEMA staff calls their "non-regulatory products." Need to integrate critical environmental information with NFIP flood hazard identification to support improved community planning and decision making.

A major piece that should not be left out of an overall approach is the geographically-identified range of natural resource values and functions and conditions that are needed to maintain environmental health within floodplains and watersheds and that are being impacted by climate change, sea-level rise and other changes in watersheds, including urbanization. Such information must be sourced from a wide variety of disciplines and agencies. As part of reforming risk and impact data systems for the future, TMAC and FEMA should work to assure that critical environmental planning data that is needed by communities can be accessed and analyzed in the context of its digital flood and erosion hazard maps. While the challenges of climate change and its potential impacts on the built environment are of enormous importance, we also must plan for environmental and natural resources impacts and changes, which often will bear heavily on the quality of life of our communities and health of our citizens and economies.

While the array of such resources is broad, just one example of such resources that should be identified and evaluated for future impacts would be the nation's coastal estuaries and primary nursery habitats which support the nation's fisheries. The planning problems may be how will these resources remain productive as ocean levels and shorelines advance landward and as public agencies and landowners construct more and more hardened shoreline structures and floodwalls in response, which in turn often reduce critically important shallow water fisheries' habitats. Identifying where these resources are located and characterizing the likely impacts on their survival or productivity as conditions are changing or are likely to change will be key information communities will need for wise land use, hazard management, and other decision making. A further dimension of this natural resource array would include "natural infrastructure" and areas capable of establishing "nature-based measures" as part of flood risk reduction strategies.

As we currently find ourselves in the midst of an explosion of new technologies for identifying and estimating flood and other hazards, many of these same technologies should be brought together for communities' improved environmental planning, fundamentally to support greater overall resiliency

and sustainability. I would hope that ultimately FEMA's flood mapping, working with the full range of other partners, will result in major steps forward in providing key tools for climate-informed, wise floodplain planning for community environmental management as well as for the built environment.

LaShaunté S. Martin, Esq.
Deputy Legal Counsel
Louisiana Governor's Office of Homeland Security and Emergency Preparedness
1500 Main Street
Baton Rouge, LA 70802

TO: TMAC DFO
DATE: October 2015
Our state (of Louisiana) would add a request to make the meetings or portions of the meetings available via a webinar or conference call, so that interested parties could at a minimum listen to discussions and presentations with and to the TMAC, and to have such webinar notices either included in the Federal Register Notices of the TMAC meetings or placed inside the agenda on the TMAC website. I'm not sure if this request would be inserted in the Annual Report as one of the Processes and Procedures. Thank you very much for allowing us this opportunity to comment.

Mr. Godesky invited members of the public to make any additional comments for the official public comment period, but none were received.

Mr. Godesky opened the floor for pre-vote public comments, per FACA requirements, and one comment was submitted to the Council.

Mr. David Conrad, Water Resources Policy, submitted the following comment:

I appreciate the opportunity to provide comment. My name is David Conrad, and I am a Consultant on Water Resources Policy, My comment responds to a Council discussion earlier regarding Section 4.3.7- Estimating Future Conditions Coastal Analyses. I understand why the Council has decided to drop the two sentences at the end of this section today.

But for the long term I would urge that the Council not completely drop its attention on how wave modeling is done and should be done, as it relates to shoreline buildings in the future.

An arguably analogous modeling matter, used by FEMA for many years might be how FEMA discounts the "protective" nature of man-made structures, such as levees, berms, and embankments that do not meet the engineering standards of survivability to at least the 1 percent annual chance flood. In that case, ineffective levees cause floodplain management mapping to be the "natural" floodplain.

I would hope that in the future the Council would consider commenting and possibly making recommendations regarding the current practice of mapping based on the temporary retarding of wave impacts of front-line buildings in a large storm.

Should FEMA consider identifying some other basis of identifying the landward reach of wave-related impacts for purposes, for instance, of identifying V-zones? Does considering future conditions add impetus to possible changes in methodology?

I suggest such questions may not be fully understood today, but that this subject might be deferred for future TMAC consideration in the coming year or years ahead. Thank you.

The Council voted to adopt sections 4.1, 4.2, and 4.3 of the TMAC 2015 Annual Report, with amendments as discussed in the meeting today.

2015 Annual Report Section 3 – Quality of Flood Information

Mr. Dorman noted that Mr. Jones and Mr. Rodriguez drafted section 3, *Quality of Flood Information,* and it has been edited and reorganized to provide better structure to the report. Ms. Shirley asked for clarification on a sentence under section 3.2.1, *Precision, Accuracy, and Resolution*, which reads, "Another reasonable expectation is that flood hazard and flood risk information will be produced at a resolution that is high enough to capture spatial variability in parameters of importance." Mr. Jones clarified the intent, but agreed to work with Ms. Shirley to revise the sentence to be more understandable. Members discussed the difference between uncertainties and inaccuracies and the way in which the two are related. Ms. Grassi suggested adding more language about the relation between the two, as the current narrative treats them as two separate topics. Mr. Dorman suggested adopting the section and following up after the meeting for clarification. Ms. Durham noted that there are three elements to risk assessments related to flooding, not four, and the narrative needs to be updated. Ms. Shirley suggested utilizing the Elements of Risk Assessment graphic to discuss how uncertainty is propagated throughout the process, and volunteered to follow up with Mr. Kunreuther to discuss incorporating it. Ms. Durham motioned to adopt 2015 Annual Report section 3. The motion was seconded and the Council voted to adopt section 3 of the 2015 Annual Report.

Mr. Dorman made a motion to adopt 2015 Annual Report section 5, *Glossary*, and 2015 Annual Report section 6, *References*, as discussed and amended in the meeting. The motion was seconded and approved.

2015 Interim Reports

Mr. Dorman asked the Council how they would like to address Ms. Lathrop's motion made at the beginning of the day, "To allow for final verification of facts and language, I make a motion to present 2015 Annual Report section 1, Recommendations (as adopted in October 2015 TMAC Meeting), List of SME Presentations and list of TMAC Meetings (taken from 2015 Annual Report Appendix) as our Interim 2015 Annual Report to the Administrator of FEMA on the annual activities of TMAC, with the supporting statements and documentation as our full reports, along with Executive Summaries for each full report to be approved for release at the December meeting of TMAC." He noted that the legal counsel has advised that there needs to be two separate reports for the 2015 Annual Report and Future Conditions Report.

There was a motion to amend, adding a separate report for the Interim Future Conditions Report that will incorporate the respective sections as previous motion (Section 1, Recommendations, list of SME Presentations and TMAC Meetings) as Interim report to the Administrator of FEMA. The motion was seconded and adopted by the Council.

Mr. Dorman noted that 2015 Annual Report section 1, *TMAC Charter*, and section 2, *Background*, still needed to be voted on. Mr. Jones noted changes needed for the table of TMAC members and requested that the full report be check for proper use of the terms "flood hazard" and "flood risk." Mr. Mason motioned to adopt both sections, and the motion was seconded.

Mr. Godesky opened the floor to the public in order to received pre-vote public comments, per FACA requirement. No public comments were received. The Council unanimously voted to adopt the motion for the interim reports, 2015 Annual Report section 1, *TMAC Charter*, and section 2, *Background*.

Adjournment

Mr. Dorman thanked the members for their participation. Mr. Godesky called for a motion to adjourn the meeting, which was seconded by Mr. Dorman. The meeting was adjourned.

Action Items

- Mr. Jones and Mr. Crowell will work on Future Conditions Report section 2 and ensure the correct zone information is included.
- Future Conditions Subcommittee will rewrite the Future Conditions Report Executive Summary and present to the revision to the TMAC at the December 9-10, 2015 meeting.
- Mr. Rodriguez will provide an updated percentage of the map inventory that is considered New, Validated, or Updated Engineering (NVUE)-compliant.
- Mr. Jones and Mr. Ferryman will update 2015 Annual Report Section 4.5, *Flood Risk Assessment and Communication*, will to reflect the revision to recommendation 14.
- Mr. Ferryman and Mr. Kunreuther will review the narrative on the National Research Council report on the role the NFIP could play in encouraging mitigation measures, and also ensure 2015 Annual Report Section 4.1, *Community of Users and Uses,* is formatted like the rest of the report.
- Mr. Jones and Ms. McConkey will work on 2015 Annual Report Section 4.1, *Community of Users and Uses,* to determine whether the issue analysis section could be used to frame all of section 4.1.
- Ms. McConkey and Mr. Jones will work with Dr. Honeycutt to revise 2015 Annual Report section 4.3.5, *Riverine Hydraulics.*

Certification

I hereby certify that, to the best of my knowledge, the foregoing minutes are accurate and complete.

John Dorman 1/16/16

John Dorman
TMAC Chair