National Flood Programs & Policies in Review (2015)

A publication of the Association of State Floodplain Managers

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On the cover: A scene from Bombay Hook National Wildlife Refuge in Delaware. Photo by: Tim Williams/USFWS via flickr

PREFACE

At no time in our nation's history has national flood policy been more important. Current research shows that our sea level is rising, storms are intensifying, and flood damages are significantly increasing. Areas that have never flooded before are now flooding, and we've seen flood damage costs rise from what was about $1 billion a year in 1900, to more than $10 billion a year in the 2000s. Two recent hurricanes – Katrina and Sandy – cost the US taxpayer more than $200 billion.

The Association of State Floodplain Managers, which began more than 45 years ago as a grassroots organization of floodplain managers in the Midwest, now includes more than 16,000 members worldwide. Our mission has always been to help develop and implement national flood policy and programs that reduce damages, human suffering and taxpayer costs of flooding; help communities and states become safer and prepare, respond, recover and mitigate flood impacts. We've worked hard to accomplish that without causing adverse impacts on other properties, and will continue to increase awareness and understanding of the critical, environmental, natural functions and cultural value of our nation's floodplains.

For these reasons, we have updated our *National Flood Policies and Programs in Review (2015),* which puts forth hundreds of recommendations we've identified as ways to improve national flood policies and programs to better serve the nation. With the help of more than 16,000 floodplain management practitioners who are ASFPM members, we believe these ideas and recommendations will improve and enhance activities at all level of government, and by individuals and the private sector.

This document is laid out in five major sections, with specific subsections under each. Each section lists specific recommendations and who should be responsible for its implementation. We also explain why the change is needed.

Principles used in writing and developing these recommendations:

- This report covers ALL federal programs, not just FEMA, NFIP and US Army Corps of Engineering programs. There are at least 26 federal agencies whose programs and policies can either decrease or increase flood risk. While we have not addressed every aspect of every program, we have tried to address key issues in most programs.
- We aimed high! We were shooting for recommendations that ultimately will lead to the successful management of flood risk in the nation, not what is necessarily politically possible at this point in time or meets current law. A recommendation may not be authorized under current law, but if critical, we may suggest Congress should change the law to better serve the public interest.
- We realize state flood policy is an important part of effectively managing flood risk. States with effective flood policies see reduced flood damages from similar events compared with states that do not. ASFPM has another document many may find useful: "Floodplain Management 2010 – State & Local Programs."

Table of Contents

(Each section below is hyperlinked to that section in the document.)

Topic Area	Page
Introduction and Acknowledgements	4
Section 1. Flood Hazard Mapping and National Data Sets	**12**
A. Ensure Flood Mapping, Hydrology & Hydraulics Produce Accurate Flood Maps	13
B. Using Data & Technology to Support Flood Risk Management	19
C. Identifying and Adapting to Increased Risk from a Changing Climate	22
Section 2.Flood Loss Reduction Approaches	**24**
D. Floodplain Development Standards , Regulations & Codes—Continue to Upgrade	25
E. Flood Insurance-A Vital Tool for Reducing Flood Risk	33
F. Mitigation and Risk Reduction to Reduce Long Term Taxpayer Costs from Flooding	39
G. Disaster Response and Recovery Must be a Springboard to Sustainability	44
H. Structural Projects—Balancing Economics, Environment and Equity	49
I. Economic Methods & Policies Must Support Cost Effective Long Term Solutions	55
J. Building and Rebuilding Sustainable Infrastructure and Public Buildings	57
Section 3. Natural and Beneficial Floodplain Functions	**58**
K. Natural & Beneficial Functions Reduce Flood Losses	59
L. Effective Stormwater & Watershed Management	62
Section 4. Flood Risk Management in Special Hazard Areas	**64**
M. Sustainable Flood Risk Management of Coastal areas	65
N. Arid Regions Flooding—Integrated Management Needed	71
Section 5. Flood Risk Governance	**73**
O. Federal Collaboration and Leadership is Essential	74
P. Building State & Local Capability Reduces Long Term Costs	77
Q. Partnerships & Incentives Create a Shared Approach to Managing Flood Risk	80
Glossary	82

Introduction

Historical events that impacted today's national flood policies

National flood policy impacts most people in the United States, even though only about 10 percent live in high risk flood areas. Those outside the floodplain pay flood disaster costs for infrastructure and homes/businesses, loss of jobs (40 percent of small businesses do not reopen after a major flood), business interruption costs, loss or unavailability of critical facilities like water treatment plants, hospitals, fire stations, etc. More than 22,000 communities in the nation belong to the National Flood Insurance Program because they are prone to flooding from rivers or coastal storms. The NFIP has more than five million flood insurance policies, with about 20 percent of those policies outside the identified floodplain. They buy it mostly because they have already been flooded. Flood damages in the nation have risen astronomically in the past century for two main reasons: One, we are seeing more intense rainfalls and storms. And secondly, we continue to build structures and infrastructure in high-risk flood areas. While the nation has done a poor job of reducing flood damages in the past century, deaths from flooding have been reduced. That's mostly due to improved storm and flood forecasts and warning systems, but also because of increased flood awareness.

Not only have more buildings been built in high flood risk areas, but we have greatly altered our natural riverine and coastal systems that could have reduced flood levels. Wetlands, riparian zones, and saltwater marshes are natural buffers to rising flood waters or storm surge; however, those natural protections have been greatly altered, paved over or developed, which eradicated our natural defense to flooding.

In the early part of the 20th century, the nation was convinced it could overcome Mother Nature with engineering works to control flooding. This meant our national flood policy focused on building flood control structures. There are about 40,000-50,000 miles of levees and more than 78,000 dams along our rivers and coasts. These structures are designed and built to control only a certain level of flooding, so we see those flood control structures become overwhelmed by larger than design floods. Flood control structures also require ongoing operation and maintenance (O&M), as they deteriorate over time—just like bridges. When structures fail or are overtopped with larger events, we experience catastrophic flood damages for two reasons: one, more development occurs behind the levee because people and communities incorrectly believe there is no longer a flood risk there; and two, new development has not been elevated or otherwise protected, so levee failure may result in very deep flooding, causing total damage to the building and infrastructure instead of just minor flooding. Much of these damages are paid for by taxpayers through disaster relief, so national disaster policy is interlinked with national flood policy.

National flood policy started to change in the 1960s because flood disaster costs were greatly increasing. Disaster costs were the primary means of recovery after big flooding events because people and communities could not buy flood insurance. Private insurance companies could not spread the risk enough, so they would not sell flood insurance. The concept championed by people like Gilbert F. White was to adjust human behavior instead of adjusting natural systems that reduce flooding. This meant using what was termed "nonstructural measures," such as guiding where and how building were built in flood hazard areas.

Two big policy changes occurred in the 1960s and '70s. The first was to establish the National Flood Insurance Program, where the federal government would back and sell flood insurance in exchange for communities and states adopting local ordinances to guide where and how buildings were built. Flood insurance is required for buildings with a federally-backed mortgage. In this way, people who insisted on building or living in high-risk areas would pay at least part of the costs by buying flood insurance, and they would recover more quickly. The second big change was the federal Executive Order on Floodplain Management (EO 11988). That directed all federal agencies to not build or provide grants for any development, or provide technical assistance for those actions (including critical facilities like hospitals, fire stations, water supply systems, etc.) in flood hazard areas unless they could show it would not increase flooding, flood damage or flood risk.

The national policy embodied in the NFIP is primarily one of reducing damages to structures built in flood hazard areas, not to avoid building in flood hazard areas. The NFIP does have a so-called "no build zone" along rivers, but has no such setback in high-risk areas along the coast. The primary NFIP requirement is to elevate building to the 1 percent chance (or 100 year) flood elevation, which is a relatively small flood, especially in urban areas. It has a one in four chance of occurring over a 30-year mortgage. Other developed nations, such as the UK and in Europe tend to have higher standards for development.

National flood policy has also changed regarding structural flood control. Agencies like the US Corps of Engineers were building levees in urban areas to higher standards, like the 0.2 percent (or 500 year) or larger until the NFIP standards removed all areas behind an accredited 1 percent (100 year) levee from the requirements for development regulation and flood insurance purchase. After that, few communities wanted any levee larger than the 1 percent, since the community was typically responsible for 35 percent of construction costs, and their primary interest was often more development in the area "protected" by the levee, not just to protect existing development behind the levee.

The above discussion shows how national flood policy can drive good or poor community and citizen actions or lack of action, since it will impact the costs of living in flood hazard areas, or impact how much of their tax money will be used to support development of flood risk areas. Development decisions are made at the local level every day, but the impacts of that development is seldom know by those in the community who will be impacted.

Integration of National Flood Policy with other National Policies

In the 1950s and '60s, it became clear to Congress and the Presidents that flood policy did not stand alone, but needed to be integrated with other policies like disaster, wetlands and other water resources, water quality, transportation, fish and wildlife resources, community development, coastal management, economic development, agriculture and others. As a result, the Water Resources Council was created, which is an undersecretary level federal interagency group of 26 federal agencies to help integrate programs and policy across the water quality and quantity policy spectrum. A subgroup of WRC was the Interagency Floodplain Management Task Force, made up of about a dozen of the agencies most involved in managing flood risk. That group met regularly to share what each was doing in their programs, and to identify where there were conflicts and gaps in flood policy, and to explore ways agencies could work together to address flood risk problems. This group also asked to have state representative participation because they recognized many states had their own flood policy and programs, which needed to be integrated with federal flood policy and programs. This subgroup

also recognized that communities could only regulate land use or building construction if the state granted them authority to do so. ASFPM regularly attended their meetings and relayed what was happening in flood policy in states throughout the nation.

This broad recognition of the connection of many water policies also led to the recognition that water quantity and quality must be strongly connected, and that what happened outside the simplistic 1 percent chance floodplain would have impacts downstream and upstream. Managing the entire watershed could be important to water quantity and quality. However, attempts to plan and manage on a watershed basis were largely unsuccessful, with just a few exceptions.

The environmental movement of the late '60s and early '70s led to creation of agencies like the Environmental Protection Agency to address water quality and stormwater; Endangered Species Act, National Environmental Policy Act; broadened US Department of Agriculture conservation programs; expanded water data collection in USGS, NOAA and DOI; and the creation of two key presidential Executive Orders: one on floodplain management (EO 11988) and the other on wetland management (EO 11990). The intent of the EOs was to ensure federal taxpayer funds and federal actions were not increasing flood damages or destroying valuable wetlands. Federal agencies were required to write rules to implement these orders.

This also led to recognition that some past flood control policies were having adverse impacts on environmental values and sometimes destroyed valuable ecosystems that would have attenuated floods and reduced damages if left in place. The Interagency Floodplain Management Task Force produced a number of versions of the "Unified National Program for Floodplain Management," which clearly identified the link between reducing flood damages and protecting and enhancing natural ecosystems. For the past 40 years, all levels of government have been trying to integrate these values, with varying degrees of success. Those two values are embodied in the mission of ASFPM.

One policy nexus that has never been integrated is flood policy and disaster policy. High disaster costs paid by taxpayers because flood insurance was not available was part of the justification for passage of the NFIP in 1968. However few if any links are made between the effectiveness of local and state actions to reduce flood damages and the amount of taxpayer disaster relief they get when flooded. If anything, current policy is perverse in that the less done to reduce flood damages in a community or state, the higher the share of those costs the federal taxpayer picks up after the disaster. And often, the people who did not buy flood insurance end up being made whole by taxpayers, effectively penalizing those who did buy insurance.

Evolution of National Flood Policy

In the early to mid-1900s, the national flood policy was "flood control." In the last half of that century, national policy moved more toward federal-state-local shared management of flood hazards that included some measures to guide development in flood-hazard areas, which was termed "floodplain management." The focus was to identify the flood-hazard area then guide development within that area. A fairly simplistic policy concept was used: the federal government will identify areas that will flood in a 1 percent chance (100 year) flood; and then locals and states must require new development and major redevelopment to be elevated above that 1 percent chance flood elevation if they wanted their citizens to have access to federally-backed flood insurance.

That has often been characterized as "we will identify the flood hazard area, then show you how to build in it." Note the policy did not include incentives or requirements to avoid development in the flood-hazard area, except for a modified and reduced floodway that was intended to be left open along rivers.

If communities wanted the federal government to assist them in building flood control projects, the non-federal share moved from 0 percent in 1930s to 35 percent starting in 1986. After it was built, local sponsors were always required to become the owner and to perform all O&M on the flood control structure in the future.

In the late-1980s, non-structural mitigation became a key part of programs like the Disaster Relief Program and NFIP. For the first time, taxpayer public assistance would help not only rebuild a damaged public building or infrastructure, it would cost share cost effective mitigation of the facility so the next disaster would not cause the same damage. Similar, but smaller mitigation provisions have been added to the NFIP.

As we move into the second decade of the 21st century, national flood policy is evolving to "flood risk management." This concept recognizes that floods will happen and humans cannot prevent all flooding, but can manage flood damages and impacts on ecosystems using a variety of tools in order to reduce damages and be more resilient from floods. It also recognizes that the most effective tools to manage flood risk rest with communities and states through land use and building codes, as well as planning that considers current and future social, economic and environmental conditions in the local community.

Flood risk has two components: probability and consequences. Current flood risk management usually treats properties at different risk as though they have the same risk. Most flood maps show the entire flood-hazard area as one risk regardless of depth of water, and flood insurance rates are averaged within zones and across the nation in widely differing geologic and hydrologic scenarios. Probabilities within the 1 percent chance floodplain vary widely, and the consequences to a building will vary widely, dependent not only on the value of the structure, but the depth and duration of flooding, as well as other factors like velocity, erosion and subsidence, proximity to the point of failure for a levee and others.

NFIP mapping is now starting to show varied depth grids within the identified floodplain, and the flood insurance program is looking at how to improve their rating process. While the 2012 NFIP reform bill directed a whole new list of considerations FEMA must include in its mapping process, like future conditions such as sea level rise, those considerations have not yet been implemented. USACE now has a Flood Risk Management program and budget, with a heavy emphasis on state and local collaboration.

NFPPR—What has Changed in Flood Policy Since our Last Report in 2007

Since 2007, much has happened. Whether the net balance of changes can be called positive or negative is difficult to say.

Significant flood events occurred everywhere – costing more than ever. Record flooding in Iowa in 2008, considered one of the two worst floods in Iowa's history, caused more than $10 billion in damages. Later that year, Hurricane Ike caused extensive damage in Mississippi, Florida and inland resulting in nearly $30 billion in damages (and considered the third costliest hurricane of all time). 2011 saw a significant flood on the Mississippi

River from Cairo to its mouth, testing the Mississippi River and tributaries – the nation's largest structural flood control system. The event resulted in the "blowing-up" of the Byrds Point Levee for only the second time in 80 plus years and opening the Bonnet Carre Spillway and Morganza Floodway to provide planned overflow flood conveyance outside the levees, resulting in the mainline systems operating as planned. Then in 2012, Hurricane Sandy became the second costliest hurricane of all time, causing more than $70 billion in damages. In 2013, Colorado experienced its most heavy rainfall event (cumulatively 15-20 inches) causing more than $4 billion in economic impact and damages.

During that time, work on rebuilding many areas in the Gulf as a result of hurricane seasons of 2004 and 2005 has progressed – albeit unevenly – and reinforcing the notion that flood recovery can take a very long time. The New Orleans population is still about 20 percent below the pre-Katrina population. And while some Katrina-ravaged neighborhoods have not recovered, sales tax revenues are now higher than before Katrina. Much of New Orleans is still way below sea level, and at high risk in major storms.

Other factors that have affected the management of the nation's floodplains in the past eight years include:

- Greater knowledge of the effects of climate change including sea level rise (SLR). While still a very politically charged issue, communities, especially on the eastern seaboard, are experiencing significant impacts of SLR now.
- Technology, especially as it relates to hydrologic and hydraulic modeling, LiDAR, and flood event scenario modeling, has changed rapidly. This has generally resulted in lower costs for data collection.
- High crop prices for several years resulted in significant pressure to take land out of the Conservation Reserve Program. Many of these lands were flood- and flood-erosion prone.

How have we responded?

Without question, there has been some forward movement in the nation's policies for flood risk management, and there has been some backsliding. First the notable advances, many of which we proposed in 2007:

- Congress passed a Water Resources Development Act (WRDA) in 2007 that established a National Levee Safety Committee to make recommendations on the structure of a National Levee Safety Program. Subsequently, in 2014, another WRRDA passed, which put into law a structure for a national levee safety program that needs funding and implementation.
- Congress actually agreed flood insurance premiums needed to move toward true risk rates. This occurred mostly because the NFIP was $24 billion in debt, with little hope of paying the debt.
- Flood mapping was addressed comprehensively in the 2012 NFIP reform. Congress authorized a National Flood Mapping Program, including identifying what elements should be included in identifying flood risk. It reestablished the Technical Mapping Advisory Council to advise FEMA how to set priorities for mapping and how to consider other aspects in mapping, like future conditions.
- The Hurricane Sandy Rebuilding Task Force implemented the first uniform Flood Risk Reduction Standard for all Sandy-related rebuilding projects, mandating a protection standard 1 foot above the base flood elevation. Subsequently, the President issued Executive Order (EO) 13690, which updated the EO 11988 on floodplain management to include a new Federal Flood Risk Management Standard. This standard is meant to ensure taxpayer investments in flood hazard areas is protected from future flooding.

- A key element in flood mapping is good land contour maps that will match engineering models to depict where flooding will occur. Following USGS's 2012 National Enhanced Elevation Assessment Report and other recommendations for nationwide LiDAR to support flood mapping, the survey implemented an initiative called 3-DEP to produce high quality LiDAR for all areas of the nation over the next seven years.
- The administration developed and issued new Principles, Requirements and Guidelines (PR&G) to guide federal agencies when planning and funding water resources projects, which would include activities like levees.
- Federal agency collaboration on flood policies increased, including the reconstitution of the Federal Interagency Floodplain Management Task force in 2010, and establishment of the Mitigation Federal Leadership Group in 2013.
- Some agencies recognized the federal top-down approach to manage flood risk was outdated and the nation needs to move to a shared management approach. NOAA has always advocated this and in 2007, NOAA initiated the Digital Coast initiative, which uses a partnership approach to identify, develop and serve tools and data to users. USACE has increased its efforts to provide technical assistance to states and communities through their Silver Jackets and other programs. The Silver Jackets program started as a pilot program in 2006 to successful, nationwide implementation resulting in teams in 41 states.
- USACE proceeded to develop a national levee inventory, in cooperation with FEMA.
- ASFPM has expanded its tools for communities to use for reducing flood risk; notable is the No Adverse Impact series of "how-to" guides for locals.

Notable backslides on Flood policy include:

- Congress slowed the progress towards flood insurance full risk rates in 2014 after some backlash and did not address flood insurance affordability for those policyholders who truly cannot afford the premiums.
- Nonstructural flood mitigation was dealt a blow when FEMA changed eligibility criteria for post disaster grants to fund major mitigation projects like levees and dams, which have logically been under the purview of agencies like USACE, USDA and DOI. This will take money away from the small budget for nonstructural, low impact actions only FEMA has funded, like elevation and/or relocation.
- Attempts failed to have major federal funding reward communities and states that do more to prevent flood disaster by providing a greater cost share. This means that even a greater share of flood disaster costs are borne by the federal taxpayer. Congress now provides the vast majority of funding to recover from disasters from the federal taxpayer, which has moved from 20 percent to more than 80 percent in the past few decades.
- Long-term federal streamgages continued to be discontinued due to lack of funding and the National Streamflow Information Program has yet to be fully implemented. The NSIP was designed and authorized by Congress to operate as a federally-funded "backbone" network, supporting approximately 4,750 streamgages and tidal gages.
- The federal agencies have not updated some key flood policy documents; e.g. the Unified National Program for Floodplain Management (last done in 1986).

Looking Ahead

Potential policy changes in next five years that are being discussed in these policies/programs:

- Reauthorization of NIFP is due in 2017—addressing affordability for insurance while continuing the movement to full risk rates, getting flood mapping completed for all 22,000 NFIP communities, and to begin meaningful delegation of NFIP activities to the states.
- Fund and implement the levee safety program as laid out in the 2014 WRDDA, with a thrust on developing national standards and building state capability.
- PL 84-99 revisions by USACE to better share responsibility and funding between federal taxpayers and project sponsors/communities for actions related to flood control projects.
- Development of individual agency guidelines to implement new PR&G on water resource projects.
- Expand the economic analysis to incorporate ecosystem benefits for agencies other than FEMA, which is already using those benefits in its mitigation grants.
- Complete the guidance and process for upgrading the Clean Water Act jurisdiction.
- Clarify how NFIP will incorporate ESA requirements into the program.

External factors affecting flood risk management

- Populations in the US will increase much faster than most developed nations, and much of it will be focused in high risk flood areas, increasing the challenges facing flood risk management.
- Changes in sea level rise and storm intensity and flooding due to a changing climate.
- The nation's infrastructure is in poor shape and will get even worse unless a stable funding source is developed to upgrade and maintain that infrastructure.
- Rapid advance in technology for flood mapping, forecasting, land contour mapping and data collection, compilation and utilization for actions related to flood risk reduction, including graphic displays to communicate risk and increase risk awareness.
- Funding will likely decrease at the federal level, meaning states and locals will no longer be able to externalize the consequences of building at risk.

Executive summary

This report describes some of the key changes in federal floodplain management policy and programs over the last several years, and points out areas where deficiencies are hindering progress toward reduction of flood losses and protection of floodplain resources. Some of these deficiencies have persisted for years, while others have only lately become apparent. ASFPM also points out specific, achievable ways in which each deficiency can be remedied and how existing successes—of which there are many—can be shared, expanded and applied to other activities, programs or regions of the nation. Through this analysis, improvements are identified that would help the nation move toward a future that includes sustainable floodplain lands and disaster-resilient communities. ASFPM believes implementing these recommendations will help the nation cultivate a holistic perspective, spread responsibility more equitably, and foster sensible attitudes toward the use of environmentally sensitive lands. These action items will be the focus of ASFPM efforts over the next five years or so, in its work with state and local governments, federal agencies, insurance industry, individual professionals

and organizations in floodplain management and related fields, Congress, and its many other colleagues and partners in public and private sectors. ASFPM invites all who are dedicated to the future well-being of this nation to join in working toward an enhanced level of resiliency in the face of flooding, reduce overall flood losses, and develop a sustainable relationship to its riparian and coastal lands.

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ASFPM Leadership

ASFPM Board of Directors (approved these recommendations Feb. 25, 2015)
ASFPM committee chairs (solicited draft recommendations from ASFPM members)
ASFPM members who submitted suggestions based on their extensive experience
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Section 1 (A, B & C): Flood Hazard Mapping and National Data Sets

Flood maps show areas in a community that will flood in a certain probability of flooding. They have been produced since the 1950s and '60s, when Jim Goddard at the Tennessee Valley Authority worked with communities in the Valley to produce maps that identified the 1 percent chance floodplain, then worked with the community to adopt an ordinance to guide development within that flood hazard area. While some local maps were developed (e.g. Maumee River in Ohio after the 1913 floods), the TVA effort was designed as a model that could be used nationally to implement the NFIP that Gilbert White espoused as a means to adjust human behavior instead of adjusting our rivers and natural flood defenses.

The NFIP has spent more than $4.2 billion mapping flood hazard areas over the past 37 years. That has resulted in flood maps for about one third of the 3.5 million miles of rivers and coasts in the nation. About half of those maps have a flood elevation included—meaning only about 1/6 of the nation's floodplains have a map with an elevation the community can use to guide development. That also means the flood insurance program does not have accurate flood elevations on which to base flood insurance rates in those areas.

NFIP flood maps are more accurate and will be better accepted and utilized by communities if the community and the state are heavily involved with the NFIP in producing the map. Many progressive communities provide local funding to assist in producing flood maps, since the maps are utilized for many purposes by the community, such as comprehensive planning, flood mitigation planning and locating critical facilities like fire stations, water plants, evacuation routes, etc.

The three basic elements needed to produce an accurate flood map are: (1) hydrology or how much water will flow in a certain flood event (streamgage records or other mean are needed to make those projections), (2) cross sections of the floodplain so a hydraulic model can calculate how high the flood level will get with that much water in the steam, and (3) a topographic map of the land in and adjacent to the river or coast (including underwater profile) to accurately calculate the flood level and to show the buildings and ground that will be inundated when that level of flooding occurs.

One big advancement in the past 25 years is the technology and process for topographic mapping. Forty years ago, we used USGS 20-foot contour maps, and now mapping can be done using LiDAR technology to produce ground level information faster and less costly, provide a more accurate depiction of ground elevations, stream cross sections and even building footprints and types.

Accurate and timely data sets are essential for managing flood risk. This includes everything from streamgage data of past flooding to updated LiDAR mapping to the historical data of flood damages, a compilation of disaster costs over time and location, and cumulative damages to buildings.

It is apparent that flood risk changes over time due to increased development in watersheds, increased storm intensity and increased development in flood hazard areas increased the consequences of flooding. Changing climate has led to rising sea levels, which many coastal communities are already facing. The recommendations here are focused on ensuring national flood policies and programs help communities identify and adapt to the impacts of climate change.

Subsection A. Ensure Flood Mapping, Hydrology & Hydraulics Produce Accurate Flood Maps

Recommendation	Explanation/rationale
Flood Map Funding and Oversight	
A-1 MAP FUNDING AND MAP MAINTENANCE a) Fully fund and implement the National Flood Mapping Program (NFMP) as authorized by Congress in the 2012 National Flood Insurance Program Reform (at $400 million/year budget from appropriated funds). b) Fund map maintenance and regular map updating as continuation of the NFMP. [Congress, Federal Emergency Management Agency (FEMA)]	*Accurate Flood hazard area mapping is the backbone of this nation's flood resiliency and sustainability efforts. Priority should be placed on enhancing map accuracy and completing flood hazard mapping for the entire nation. Refer to the ASFPM 2013 "Flood Mapping for the Nation" Report for an estimate of the extent of expected costs involved.* *Once developed, flood maps need to be continually updated to stay accurate and relevant. Once all 22,000 communities are accurately mapped, policy fees should be able to fund map maintenance.* *To avoid falling farther behind in the flood mapping and maintenance needs, annual funding at a substantial (authorized) level is needed.*
A-2 Continuously capture unmet mapping needs from the Map modernization (Map MOD) and Risk Mapping Assessment Planning (Risk MAP) scoping, discovery efforts and input from state and local partners in order to report to Congress/partners an accurate scope of needed mapping efforts. Summarize these unmet mapping needs by state and county and provide the data to Congress and the Technical Mapping Advisory Council (TMAC) and NFIP state/community partners for their information and use. [FEMA, states]	*An accurate accounting of mapping needs, by state and county, needs to be produced and shared with Congress (as well as with TMAC) so that Congress has a clear understanding of the enormity of the task at hand and can plan for a continuous funding stream needed to fulfil the challenge.* *TMAC needs this information to get a handle on the scope of their tasks, and NFIP partners need it so they can do yearly and long-term planning for mapping.*
A-3 TECHNICAL MAPPING ADVISIORY COUNCIL a) Utilize and implement the recommendations of the 2014 TMAC. b) TMAC should become a permanent council or advisory committee. See: A-5 [Congress, FEMA, federal, states, local agencies]	*When the 2014 TMAC recommendations are made available, they will need to be funded and implemented.* *Having TMAC as a permanent council would insure Congress and FEMA have access to an independent, informed body of knowledgeable mapping experts at any time when the need for such timely advice would arise.*
A-4 Consider adding a $5 transaction fee to some flood map related activity, such as the Flood Zone Determination performed as part of the closing of every property; with the fee dedicated to flood mapping and map maintenance. [FEMA, Congress]	*The transaction fee concept is something that FEMA previously proposed as a way to help generate funds for flood mapping and needs to be revisited. Some kind of fee is needed so all users of the information help pay the costs of obtaining the information.*
Refine Flood Mapping Processes and Standards	
A-5 MAPPING REPORTS AND PROCESS	*In order to better understand the progress in producing*

a) Provide annual reports on the status of valid map data, as reflected in the Coordinated Needs Management Strategy (CNMS) data base, including data on modernized and non-modernized map panels. Include in this report information on metrics used to define progress in updating engineering data as recorded in the CNMS data base. [FEMA] b) Whenever possible, engineering models used to produce NIFP maps must be properly calibrated to historic flood events by using the stage-discharge relationship at USGS gaging stations; or where gage data is unavailable to historic high water marks to reduce the uncertainty associated with the model results before such models can be deemed accurate and acceptable. [FEMA, mapping partners] c) Periodically review and update the standards for establishing valid map data to enable the identification of map data that has been appropriately calibrated against historic flood events. [TMAC, FEMA, mapping partners] d) FEMA should discontinue the use of map panels when producing FIRMs. e) Flood hazard maps should include the date of the engineering study, topography and imagery, in addition to the date of publication. [TMAC, FEMA] See: B-1	*accurate, up-to-date flood maps, annual reports are needed on the status of valid map data (as reflected in the CNMS data base) that would include data on modernized and non-modernized map panels.* *Streamgages and high water marks (HWMs) on streams with no gages document historic flood events.* *Concerns have been raised regarding the accuracy of FEMA's flood hazard data. Unless engineering studies are calibrated against historic flood events, it is difficult to quantify the uncertainty of the flood hazard data being generated. The reason calibrated maps can be deemed accurate is that while the uncertainty can never be reduced to zero, it can be quantified. In instances where engineering models have not been calibrated or validated against historic flood events – the uncertainty is unknown, as is the accuracy.* *Guidelines and quality assurance protocols must be established for performing and evaluating all engineering and flood models, including the unsteady and two-dimensional models.* *Map panels are an outdated process that adds costs and complexity to mapping. This will require working with Flood Determination companies to ensure they have the data to perform their service to the NFIP.* *It is standard protocol in mapping to include the date of the source information used to develop the map.*
A-6 CALCULATING FLOODWAYS a) Change the minimum standard for designating floodways to the "full conveyance floodway" concept and continue to allow no (0.00 feet) impact for proposed encroachment into that floodway. A full conveyance floodway includes all of the area inundated by the 1 percent annual chance flood, except those shallow areas and embayment into small drains and gullies where water would be ponding, but would not effectively convey flood waters. b) Use this "Full Conveyance Floodway" to designate NFIP regulatory floodways (instead of current procedures that allow an artificial rise in flood levels 1 foot for NFIP and a variable amount down to zero rise from state to state chosen by that state). See: A-7, D-10, D-15 [FEMA, TMAC, mapping partners]	*Under current procedures the NFIP flood insurance study allows the floodway to be pinched in until the flood level rises by a pre-determined amount (NFIP default 1 foot or in some states a smaller threshold). However, the community is not required to adopt that higher elevation, guaranteeing that those who build to the BFE will experience a higher flood elevation and higher velocity due to "permitted fill" in flood fringe areas that are really the natural floodway. The time has come to accept the primary floodway corridor nature uses to convey flows also as the "regulatory" floodway.* *The 1-foot rise allowed by the NFIP results in a significant loss of conveyance areas--the floodway width decreases by 32-68 percent and velocity increases from 16-62 percent report here.* *This recommended methodology does not require any added calculations for setting the floodway limits.*

A-7 Require that for regulatory purposes the mapped floodway for an area with an accredited levee include the entire footprint of the levee through its landward toe, and that the regulations prohibit all development within the prism of the levee. See: A-6 [FEMA, TMAC]	*To ensure that development and encroachment within the prism (footprint) of a levee does not occur, the regulatory floodway should extend to its landward toe. Too often, houses and other buildings or development are allowed on the levee, leading to levee failure or overtopping and making it impossible for levee owners to maintain the levee.*
A-8 Establish national program performance standards for all flood hazard-related data layers (erosion, subsidence, closed lake basins, frazil ice, ice jams, tsunamis, debris flow and mud slides, relevant wetland and groundwater) so that data created by state, local, and other mapping partners can be readily utilized by FEMA. Performance standards/protocols can be based on existing state or federal entities that are already creating some of these products. See: D-21, M-12, D-18, N-2, N-3, N-6 [FEMA]	*Not all flood hazard-related data layers currently have a national program performance standard. Such national standards are needed for program consistency so that data developed by FEMA and other parties can be readily utilized and relied upon by FEMA and by communities that use that data to reduce flooding and disaster costs.*
A-9 DATA LAYERS AND FLOOD ZONES a) Include various flood hazard-related data layers where applicable (erosion, subsidence, closed lake basins, frazil ice, ice jams, tsunamis, debris flow and mud slides, relevant wetland and groundwater) on Flood Insurance Rate Maps (FIRMs) when data is available. b) Work with TMAC States/communities to establish new Special Flood Hazard Area (SFHA) zones (such as an "AL" zone for areas protected by levees, "AD" zone for areas protected by dams, or "E" zones for areas subject to erosion, etc.) and related locally required regulations as a condition to participate in NFIP and to discourage increased economic and life-safety exposure and liability in flood risk areas. See: D-19, D-21, M-13, D-18, N-2, N-3, N-6, H-17 [FEMA, TMAC, mapping partners]	*Due to the significance of their impact at a local level, some municipalities would like to show various applicable flood hazard-related data layers on their FIRM and regulations specific to each. FEMA should encourage this attitude and allow addition of these layers to the FIRM when valid data is supplied. FEMA should also establish new SFHA zones for these flood-related hazard layers so that flood insurance rates and premiums can be accurately determined that are commensurate with the risk.* *Flood insurance premiums for such zones should be based on actual risk (i.e., in addition to expected damage potential, qualified mitigation activities undertaken to buy down the risk, such as levees, dams, etc., should be recognized).*
A-10 Establish national performance standards for the development of data layers capturing expected future-condition flood hazards (as a result of projected sea level rise, likely flow increases due to uncompensated changes in watershed land use, expected permitted development activities such as cumulative filling of floodway fringe areas, climate change and other factors affecting flood–related risks in the future) and allow inclusion of such data layers on FIRM when data is available and requested for inclusion on FIRM by a state or local mapping partner. See: A-19, M-5, M-12, C-1 [FEMA, TMAC, mapping partners]	*To be sustainable, communities need to have access to reasonable expected future condition flood hazards data layers. Coming up with national standards for production of such data layers will be important for consistency and strategic planning at a national level. Also, allowing and encouraging the incorporation of such data layers for the community's FIRM would make it easier for those communities that have such data available and are willing to regulate at a higher standard implement such best practices.*

A-11 Expand the Letter of Map Revision (LOMR) Delegation Program to allow delegation to additional states and to state designated local authorities who are willing and qualified to undertake this aspect of program. Review, streamline, and strengthen current LOMR Delegation guidelines and qualification. [FEMA, with mapping partners]	*Strengthening current LOMR delegation guidelines would help FEMA and* Cooperating Technical Partners *(CTPs) evaluate their readiness to share the workload in such a way that it results in a more sustainable system with a better quality product at a lower price. Streamlining the process would make it attractive to many more qualified partners to take on this task, resulting in efficiency and reduced mapping costs.*
A-12 Delete the rounded, whole-foot elevations from the BFE lines ("squiggly lines") on the FIRM. [FEMA]	*There is no need to include the whole-foot BFEs with the BFE lines now that BFEs to the nearest tenth of a foot are listed on cross sections on new maps. The rounded BFEs only serve to confuse map users and increase the cost of developing the maps.*
Coastal Mapping	
A-13 Delineate Limits of Moderate Wave Action (LiMWAs) on all coastal flood maps, with no-opt-out allowance for communities. See: M-14, D-13, E-1 [FEMA, mapping partners]	*Incorporation of LiMWAs on all coastal flood maps will alert the regulating agencies of another unique flood hazard zone that would require an appropriate specific set of standards; usually for V zones.*
A-14 Develop a unique coastal A Zone definition for placing on the maps and provide that definition in the Code of Federal Regulations (CFR). See: M-14, M-16, D-13, E-1 [FEMA]	*The nature of coastal A zones is very different from A zones in riverine areas. However, a separate definition for each of these zones does not currently exist.*
New Mapping Approaches	
A-15 DELEGATION OF MAPPING a) Delegate authority and funding for mapping of all flood hazards on NFIP flood maps to qualified state and state-designated local authorities. This program should allow the mapping priorities to be developed jointly by the authorized state and local partners, with input provided by FEMA. Incentives should be developed to encourage state and state designated local authorities to provide supplemental funding to enhance "their" flood hazard mapping. b) Review and strengthen current CTP guidelines and qualifications so that those state or local partners selected for delegation would meet or exceed the FEMA's minimum expectations. c) Require delegated states to develop and maintain an archival system for all flood map models for data stewardship and storage in addition to the Map Service Center. Encourage and provide funding incentives to all states to archive flood map data in digital, electronically transmittable form. See: P-3 [FEMA, state and community mapping partners]	*Delegation and stewardship of mapping flood hazards at the state level (and sometimes even at a local level) is essential to this nation's road to flood resilience. We should start this process through baby steps of delegation to qualified/willing states and state-designated local authorities who are qualified and have a track record for such stewardship. Strengthening current CTP guidelines would help FEMA and CTPs evaluate their readiness to share the workload in such a way that it results in a less expensive, more sustainable system with a better quality product.* *FEMA's regulations are explicit in requiring the participation of the states in administration of the NFIP. 44 CFR Part 60.25 Designation, Duties, and Responsibilities of State Coordinating Agencies contains a list of duties and responsibilities, including: (b)(6) assist in the delineation of riverine and coastal flood-prone areas … and (c) Other duties and responsibilities, which may be deemed appropriate by the state … may be carried out with prior notification of the administrator.* *When states are entrusted with production and maintenance*

	of flood mapping products, they should be required to maintain an independent archival system so that all the mapping needs of a state can eventually be fulfilled under the stewardship of that state. The engineering models have significant value and therefore warrant redundant archives. North Carolina is a best practices example.
A-16 Explore potential changes to current FEMA practice with regards to funding, production, storage, management, and stewardship of various data layers used to produce FIRM or non-regulatory products. These changes could include FEMA concentrating exclusively on the development, maintenance, and updates of flood hazard-related data layers and rely on/link to other needed non-flood hazard related data layers that currently are (or can be) under stewardship, managed, and maintained by other federal or state agencies through either independent or FEMA-supported cost sharing, to produce NFIP FIRM or non-regulatory products. Under such a proposed scenario, each agency will only be responsible for the accuracy of the layers under their stewardship. Each data layer must have the proper supporting metadata, domain tables, and other necessary certification and licensing information consistent with FEMA's minimum requirements. Also under this proposed scenario, FEMA must maintain meaningful links to those non-FEMA maintained data sets, utilizing the most appropriate data sharing protocols, and ensure that mapping related data sets are available at least until any reference to them would only be for historical purposes rather than regulatory, legal or insurance purposes. [FEMA, with guidance from TMAC, United States Geological Survey (USGS), mapping partners]	*Currently, the responsibility for funding, production, storage, management, and stewardship of various data layers used to produce FIRM or non-regulatory products all rest with FEMA. This puts an enormous burden on one agency and in many cases leads to duplication of efforts by other federal and state agencies that have primary jurisdiction and expertise over some of these data layers. This also distracts FEMA's efforts from ensuring that an accurate flood hazard layer is produced and maintained for all the nation's flooding sources. Agencies should focus their efforts on producing and maintaining data layers (rather than "maps") for those products under their traditional stewardship (such as stewardship of USGS with regards to topographic data layers, stewardship of FEMA with regards to flood hazard-related data layers).* *Flood hazard-related data layers include, but are not limited to:* • *a fully digital national flood hazard data layer (primary focus for NFIP);* • *coastal erosion and riverine fluvial erosion/channel migration zones;* • *areas protected by dams, levees, diversions, reservoirs, and other structural projects (delineated simply by assuming the structural measure has failed); and* • *areas with repeat flood damage claims and adjacent areas with repeat flooding histories; and other special flood hazard-related layers (such as subsidence zones).*
A-17 The NFIP should consider transitioning its "map" production system to a fully digital decentralized system where a "map" is prepared through overlaying of appropriate mapping layers applicable to a state or a local community. Printing on demand, and distributing such mapping products can be delegated to qualified mapping partners based on guidelines developed by FEMA. [FEMA, TMAC, and mapping partners]	*Many state and local land use planning and regulating agencies are already capable and/or will soon be capable of producing their own "maps" through overlaying the hazard layers important to them on local road maps or best aerial maps with the community boundaries they maintain. This will bring about sustainability of the mapping program and buy in at the state and local level. While this will not be implemented overnight, it should serve as a long-term vision for future "flood map" production in this nation.*
A-18 Consider placing an expiration date on all Flood Insurance Studies and FIRMS or flood data, as well as anticipated date of updates. An evaluation of the accuracy and applicability of the FIRM data will need to be conducted prior to expiration and the data either re-	*The current FIRMS are based on existing conditions. Therefore some assessment should be made as to how long the FIRM is reasonably accurate (likely max of 5-15 years). The duration of valid and accurate data will likely differ based on uniqueness of hazards in each area and outside influences*

validated or revised prior to assigning a new expiration date. Dovetail with planned map update funding cycles so that the community is not penalized as a result of FEMA's funding priorities. [FEMA, TMAC, mapping partners]	*(such as watershed development, change in rainfall characteristics, presence of active subsidence, etc.)*
Hydrology and Hydraulics	
A-19 FUTURE CONDITIONS HYDROLOGY a) Federal programs should incorporate future-conditions hydrology and cumulative impacts of watershed development and hydrologic changes into flood risk determinations. Such future-condition hydrology should incorporate the impacts current and proposed flood-fringe filling and watershed land use changes and of climate change. b) Simple alternative methods to account for future-condition hydrology, such as using the 0.2 percent annual chance peak discharge in place of 1 percent annual chance peak discharge in urban areas, or using 125 percent of the 1 percent annual chance peak discharge, in lieu of detailed analysis to determine the future condition 1 percent annual chance discharge, could be utilized with justification when definitive studies are not available. c) All federal projects should use future conditions in planning, design and construction to avoid loss of level of protection and adverse impacts on other properties. See: A-10, M-5, M-12, C-1 [FEMA, Mitigation Framework Leadership Group (MitFLG), Department of Transportation (DOT), (Department of the Interior (DOI), Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration (NOAA), US Army Corps of Engineers (USACE), Natural Resources Conservation Service (NRCS)]	*Incorporating reasonably expected future hydrology (likely changes that are unmitigated) into all federal programs is necessary as a national security and sustainability measure. This should include maps produced under the NFIP flood insurance studies as required by the 2012 NFIP reform legislation. FEMA could show the resulting future conditions floodplain boundary as an advisory flood boundary for insurance purposes, and communities should consider using it for development regulation, and get significant CRS credit.* *Communities or states can use various approaches to account for future development, and should ensure those approaches do not externalize increased flooding and increased costs onto other properties from the development.* *Too often structural or development projects have been constructed or improved on one side of the river, only to raise flood elevations on the other side of the river or upstream or downstream. Such impacts must be mitigated or flooding easements purchased before construction occurs.*
A-20 Require the 95 percent upper confidence interval (instead of the current 50 percent) for flow values used in flood map studies to provide for life-safety and to account for uncertainties in determining regulatory discharges in a non-stationary meteorological environment. [FEMA, USGS, Advisory Committee on Water Information-Subcommittee on Hydrology (ACWI – SOH), mapping partners]	*Studies have shown that contrary to past assumptions, meteorological conditions are not stationary. In addition, watershed development, frequency estimation errors or bridges blocked during floods lead to underestimation of regulatory discharges and elevations. Utilizing the 95 percent upper confidence limits is a prudent way to address uncertainties regarding regulatory flows and to protect life and property.*
A-21 Promote the use of unsteady state models and 2-D models in appropriate situations, such as those described in the ASFPM white paper (July, 2014). Establish standards for 2-D modeling to show how they should be used in appropriate situations to address uncertain flow paths.	*Unsteady state and 2-D models can produce more accurate results in some instances and their use should be promoted where circumstances require such representation of the system.*

Subsection B. Using Data & Technology to Support Flood Risk Management

Recommendation	Explanation/rationale
B-1 STREAM GAGE AND TIDE GAGE FUNDING a) Provide reliable federal funds for network of nationally critical index stream gages (National Streamflow Information Program (NSIP) and coastal tide and storm surge gages). b) Identify additional funding sources for streamflow and storm surge data gathering and analysis of that data to inform and include appropriate climate change information. See: A-5 [NOAA, FEMA, USACE, NOAA, Congress, administration, MitFLG, Federal Interagency Floodplain Management Task Force (FIFM-TF)]	*Federal funding for NSIP gages need to be increased substantially. Right now the funding for the gage program is about $110M/year and should be double that. The NSIP gages are nationally-significant gages used for flood studies, warnings and evacuation and research, as well as general data.* *Establish an intergovernmental commission to develop recommendations to meet these goals. With increasing evidence of changes in climate and rainfall patterns, the enhancement and strengthening of the nation's stream gaging and tidal gaging network and stream flow data collection is becoming critical for flood risk management and long-range emergency and watershed planning and standard setting.*
B-2 Incentivize state/local/regional participation in funding of locally or regionally significant stream gages. [FEMA, HUD, USACE, DOT, NRCS]	*This is happening now, but without incentives; thus hundreds of gages are lost every couple years. Incentives could come in cost share/grant points or CRS points.*
B-3 Develop mechanisms by which NWS/local warning systems can supplement stream gage data, and provide that data in real time to help in the forecasting of stormwater and urban flooding, and evacuations. See: M-4 [NWS, USGS]	*Lots of data is being generated, but it must be shared in real time and utilized for cost savings and flood risk management – some locals already do this. Rainfall/runoff models are used in many places.*
B-4 FLOOD INSURANCE & DISASTER CLAIMS/DATA a) Make all data collected post-disaster (including NFIP claims and damage assessment information) available and easily accessible to states and communities in real time. b) Develop mechanisms where FEMA can easily and quickly provide relevant damage assessment and flood insurance claims data on-demand to state and local floodplain managers to support substantial damage determinations. c) Encourage the consolidation of information protected under the Privacy Act of 1974 into census block level data or some similar aggregation of data so that the data can be used for planning, analysis and research to assist in the improvement of the NFIP, flood risk communication and disaster response. d) Seek the exemption of this data from the Privacy Act either through legislation or by asking the	*Currently data that is shared comes too late, is incomplete, or is unavailable. Privacy Act concerns notwithstanding, basic information related to damaged buildings should be easily available to floodplain managers to help support their required NFIP duties in performing substantial damage determinations.* *Some state hazard mitigation officers (SHMOs)/NFIP state coordinators/CTPs have access to some of this data and can release jurisdiction-specific data to local governments withholding owner name and social security number. Proactive states and local governments use the information. Some academics have a non-disclosure agreement to use this data for research, but not for general release, so it is not used for managing flood risk and reducing disaster costs.* *The claim of "privacy" of much NFIP individual and geographic area data and the consequent continual state*

attorney general to clarify if all this type data is really subject to the Privacy Act. e) As a condition of receiving public assistance (flood insurance, Small Business Administration (SBA) loans, etc.) the property owner should have to sign a waiver of the Privacy Act, thereby, making the information available (only relevant data, not personal data). See: G-9, E-8, F-15 [Congress, attorney general, Department of Homeland Security (DHS), FEMA, MitFLG, states]	*of public confusion over costs and trends for 45 years has inhibited necessary research and analysis to assist the improvement of many aspects of managing risk and costs, especially in the NFIP and disaster program.* *There should be accompanying development of techniques/policies to use the data to help manage risk and reduce costs.*
National Topography—LiDAR and Bathometric	
B-5 PROVIDE FUNDING FOR TOPOGRAPHIC DATA a) Fund the USGS 3-DEP LiDAR initiative to collect LiDAR Nationwide. LiDAR is needed for the entire nation with flood mapping being one of the major uses of that topographic data since updated, accurate topo data is needed with adequate modeling in order to produce accurate flood maps and protect property and lives. b) The nation desperately needs updated, high resolution nearshore bathymetric data along all coasts. See: E-9 [administration, Congress, USGS , FEMA, NRCS, Bureau of Reclamation (BuREC), NOAA, states and locals]	*USGS has an eight-year plan to produce nationwide LiDAR at the Quality Level 2 accuracy, called 3-DEP (3-D digital elevation program). Funding sources is a combination of different federal sources, along with state and local sources in order to reduce duplication of effort. This could be prioritized where there is cost share or leveraged data.* *These are important input data for FEMA coastal flood models and for communities and states to manage flood risk on all the nation's ocean and great lakes coasts.*
General Flood risk and Flood Damage Data	
B-6 FLOOD DAMAGE AND FLOOD RISK DATA a) Collect nationwide data on number of floodprone structures, number of buildings that will be impacted by repetitive loss by 2050 and 2100, dams and levees, population at risk. 2012 Reform act requires such data as well as other critical data to be both collected and incorporated by FEMA into future flood insurance rate maps. b) The MitFLG, in consultation with state and local partners should discuss a continuing process and key roles in how to collect, aggregate, analyze and operationalize the collection and use of such data in managing flood risk, flood damage reduction, disaster assistance, and other federal construction, development, planning, funding and technical assistance programs. [MitFLG, Non-governmental Organizations (NGOs)] c) Generate a complete list of number and location of residual risk floodplain buildings and infrastructure and level B-protected buildings and infrastructure	*One dataset that FEMA should support with respect to this is building footprints. All CRS communities are now required to report the number of insurable structures in their community each year, and the change +/-. Class 4 and better are required to also report the number of buildings impacted by a levee failure or dam failure.* *TMAC can suggest means of ways to utilize this data in mapping, however, FEMA is required to carry out these requirements* *Expand this to include the "flood forensics" by year, that covers all flood damage cost;, flood response, recovery, rebuild costs; who received the funds and what was the source of funds [local, state, federal]. Use this data and information for program evaluation and adjustment and to educate the 94% of population that does not live in flood hazard area but pays the cost for the 6% that do live in flood hazard areas.* *Collection of the data on residual risk structures and*

nationwide by making community participation in NFIP, CRS, disaster assistance, Hazard Mitigation Grant Program (HMGP) grants, approval of local hazard mitigation plans, and the Corps of Engineers' Rehabilitation and Inspection program (P.L. 84-99) contingent on the community supplying and periodically updating this information. See: B-7, B-8, H-17, H-18 [FEMA, USACE, states, communities]	*infrastructures should be eligible for cost share funding from HUD, FEMA and other funding sources.* *Historical, geo-referenced data about deaths and damages can support practical measures to reduce potential impacts and investing in early warning systems, retrofitting critical infrastructure or enforcing new building codes, information and to assess the resilience of a community, state or nation.*
B-7 Establish nationwide database on disaster costs and the benefit/cost ratios of mitigation activities, organized by stream reach or shoreline as designated by the National Hydrography Dataset or state or regional equivalent thereof. Track relative disaster costs and responsibilities by levels of government and sectors. See: I-2, H-6, H-17 [MitFLG, FEMA, USACE, NOAA, NWS, HUD]	*This data is needed because federal costs for disasters are skyrocketing– potentially in trillions of dollars; average federal share has risen recent decades from modest single percentages years ago to 80 percent in recent major disasters. This Data is needed to better document costs, trends and values of mitigation.*
B-8 DISASTER COST DATA a) Determine the true cost of disasters, especially flood disasters, by research, with recommendations to develop a mechanism to account for all the direct and indirect costs of a flood disaster. Increasingly, it appears these cost may be 10 times greater than current estimates. b) Create a comprehensive database, standardized estimation techniques and framework for compiling total loss estimates from individual disasters, including all federal expenditures, economic damages, lost opportunity costs, insurance payments, Individual and Public Assistance, etc. • This could be part of the National Climate Data Center (NCDC) storm data collection effort • These data should be incorporated into the US Department of Commerce (DOC) collection of economic statistics See: I-1 [MitFLG, FEMA, USACE, NOAA, USGS, NWS, DOT, SBA]	*The FIFM-TF has started looking into this issue, and has gotten as far as seeing what data exist now and what some of the major gaps appear to be in terms of Federal costs/losses. Non-Federal/public and private losses, which are clearly part of a "true cost" definition, have not been collected yet.* *Congress should fund this effort, but will need a plan that lays out what is needed and cost. The lack of a standard framework makes it extremely difficult to accurately identify trends/causes in natural disaster losses. Moreover, this inability makes it more difficult for the federal government to identify which disaster mitigation policies represent the more cost-effective options.* *The idea of collecting these data and incorporating them into the DOC economic statistics is a recommendation made by the National Academies of Science (NAS) a decade ago.*
B-9 Provide full funding for flood risk management data gathering and development (flood loss data, GIS, stream gaging, forecasting, mapping integrated ocean observing system, research. [administration, Congress]	*This must include tracking of flood loss data over time.*

Subsection C. Identifying and Adapting to Increased Risk from a Changing Climate

Recommendation	Explanation/rationale
C-1 Develop minimum Federal Flood Risk Management Standards (FFRMS) for the expenditure of all federal disaster dollars and grants that take into account appropriate impacts of changing climate. See: A-10, A-19, O-1, G-6, L-1, D-1, H-2 [MitFLG, FEMA, Council on Environmental Quality (CEQ), NOAA, USGS, USACE, academia]	*MitFLG is working on this; appropriately with all agencies. This could also include a community resilience index, if appropriate. Providing guidance on use of climate informed science approach to determining flood elevations for federal investment.*
C-2 Support/fund/participate in data collection and analysis on impacts of and adaptation to climate change. See: B-6, B-8 [USGS, USACE, NOAA, FEMA, FIFM-TF, CEQ, states]	*There is a lot of this currently being done at universities and several federal agencies that needs to be folded together and utilized. Climate data is being gathered and adaptations prepared, which needs broad distribution/sharing/pilots (CEQ website, NOAA, etc.)*
C-3 Evaluate regional/local vulnerability of US population centers to climate change impacts and provide adaptation options, especially for increased intensity and/or frequency of major storm events. See: O-3 [CEQ, FEMA, NOAA, USGS, National Science Foundation (NSF), NRCS]	*Much of this information has been developed or is being developed on a more regional/state basis and can be utilized. Many agencies have already developed community options to address the impacts.*
C-4 Require analysis of impacts and adaptations to climate in all federally-funded grants and mitigation and community development planning for at least 50-100 years or the anticipated life of the project if longer. See: M-5, F-1, H-2 [MitFLG, federal agencies, states]	*Design of all water resources, transportation, community development, stormwater, water supply and wastewater and mitigation projects should include future climate conditions in the analysis.*
C-5 Ensure federal agencies prepare rules and procedures to implement EOs on adaptation to climate change and resilience. See: I-2, O-1, O-2 [CEQ, Office of Management and Budget (OMB), MitFLG]	*The EOs include 13514, 13653; President's Climate Action Plan, impending Federal Flood Risk Management Standard (EO 13690).*
C-6 All levels of government should mitigate and adapt to the impacts and address the causes of climate change in order to reduce the actual level of change that future generations must endure. See: O-1, O-2, F-1 [MitFLG, FEMA, USACE, NOAA, CEQ, NRCS]	*Whatever local, state, and regional level decision makers think are the causes of climate change, they should work to address those to the extent possible. Individuals and communities individually may have a small impact, but any action taken to decrease the emission of carbon and other greenhouse gases helps.*
C-7 Require all Class 7 and better CRS communities to consider and plan for anticipated climate change in their floodplain management plans. Class 1 communities should	*It can also be added to the CRS catalogue for credit by any community – some already are. This must include hazard mitigation plans; although CRS only provides credit for*

prepare maps and regulations using best available data to address the impacts of changing climate for the next 100 years. [FEMA, CRS Task Force]	*floodplain management plans, if not directly expressed would likely not be included.*

Section 2 (D, E, F, G, H, I & J): Flood Loss Reduction Approaches

Floods have always occurred and will continue to occur with the impacts of natural floods being mostly beneficial. It is only when human built environments are in the way of natural flooding that flood damages occur—thus flood damages are caused by human actions.

A variety of flood loss reduction approaches have been used by civilized societies throughout history. In this nation we tend to group them into means to adjust natural riverine or coastal systems to fit human needs, or means to adjust human development and occupance of high risk flood areas to reduce flood damages and retain the natural and beneficial functions of floodplains that naturally store and convey flood waters.

In this nation we call these groupings of approaches either "structural" or "nonstructural." The recommendations in this publication recognize that nonstructural approaches generally have lower long-term costs to society, and result in communities being better prepared to recover and adapt to future floods.

The most effective means to reduce future floods losses is to guide where and how development and redevelopment occurs. Local communities and states are the level of government that has the authority under the Constitution to guide development with planning, land use, building codes and effective disaster response and recovery. Structural measures, such as dams, levees, floodwalls, beach and shore hardening and channeling are usually done by federal taxpayers.

This section discusses multiple national programs and policies that currently make flood risk better or worse over time. Adjustments to those approaches are outlined, from the general to the specific.

Subsection D. Floodplain Development Standards, Regulations and Codes – Continue to Upgrade

Recommendation	Explanation/rationale
General Recommendations	
D-1 COMPREHENSIVE REVISIONS TO NFIP MINIMUM STANDARDS FEMA should work with state and local floodplain managers (NFIP partners) to achieve comprehensive revisions to NFIP minimum standards that also recognize and take into account adaptation requirements for watershed development, climate change and sea level rise: a) FEMA should issue a "Call for Issues" and develop a status report much like they did in 2000 to obtain recommendations for changes. b) FEMA should create NFIP regulations revisions workgroups for riverine, coastal, special hazards (arid regions/alluvial fans, erosion zones, ice jams/flooding) and subdivision/platting standards. c) Evaluate CRS activities to determine which ones should be made minimum requirements under NFIP regulations. See: M-16, N-1, C-1, E-1, F-17, O-8, J-2 [FEMA, states and community partners]	*NFIP minimum building standards have not been updated since the mid-1980s. Since that time much has been learned about the nature of flooding and reducing flood damages.* *For years FEMA has been saying they have a package of 60.3 changes ready to go, but it never gets prioritized for rulemaking. FEMA has a lot of recommendations that they collected beginning in 1998 and culminating in the 2000 "Call for Issues" status report. Since the call for issues report came out 15 years ago, it is time to have another process for FEMA to obtain input from partners, as well as the public and other stakeholders to inform an update of the NFIP regulations.* *It is important state and local partners of the NFIP are heavily involved in these revisions. For example, more than 60 percent of the population in the nation resides in communities that require buildings be elevated from 0.5 to 4 feet above the calculated 100-year flood level (Base Flood Elevation or BFE), whereas the NFIP still uses the BFE it has used for more than 45 years. This federal program, which is to protect federal taxpayers from costs for flood damages, must improve its standards to protect people and taxpayers.*
D-2 Require NFIP participating states and communities to adopt development standards in flood prone areas at least as stringent as the most current version of the International Building Code (IBC) and International Residential Code (IRC); without exception to the flood standards or American Society of Civil Engineers (ASCE) 24-14 in order to participate in the NFIP and receive disaster assistance. [FEMA, MitFLG, states]	*In several states the provisions for determining substantial damage/substantial improvements has been omitted from the code. This has resulted in one-story, two-bed, low value cabins in the V-zone being converted to multi-story, multi-million dollar homes at-grade.* *There is a debate on how to achieve state adoption of building codes. One is an incentive approach (which is usually appropriate to promote innovative/new concepts), or use the penalty approach (which is appropriate when the technology is there – now you need to do the right thing if you want federal taxpayer dollars). The proposed approach is the penalty approach – building codes are not new and there is no reason that they can't be adopted everywhere in the country.*
D-3 Support the development and implementation of a robust national flood risk management standard to guide and protect all federal investments pre- and	*Post-Sandy, the federal government was proactive by establishing a flood risk reduction standard to guide federal investment in flood prone areas. It was clear that*

post-event. See: O-1 for detail [MitFLG, administration]	*the reasonable standards used post-Sandy weren't an undue hardship and it shows that such a standard could be done nationwide in a pre- and post- disaster context.*
D-4 Promote NAI-based site development and construction standards in the International Green Construction Code (IgCC), which is a voluntary code used by communities that want to use natural or green approaches in development. [EPA, FEMA, Association of State Floodplain Managers (ASFPM), ASFPM chapters]	*The IgCC is the first model code to include sustainability measures for the entire construction project and its site — from design through construction, certificate of occupancy and beyond. The new code will make buildings more efficient, reduce waste, and have a positive impact on health, safety and community welfare.*
D-5 FEDERAL CONSISTENCY a) All federal agencies must facilitate successful compliance with other federal laws and programs (Endangered Species Act (ESA), Clean Water Act (CWA), Coastal Zone Management Act (CZMA), Coastal and Estuarine Land Conservation Program (CELCP), National Estuarine Research Reserve System (NERRS)) by addressing, as much as possible, issues programmatically versus permit-by-permit. b) FEMA should work with states and US Fish and Wildlife Service (USFWS)/National Marine Fisheries Service (NMFS) to develop regional and/or state compliance standards with ESA (e.g. FEMA Region X model standards as adopted in Puget Sound). c) EPA/USACE should provide clear definitions of Waters of the United States for use by permittees. d) Require interagency coordination and comprehensive planning for coastal and other federal land acquisitions. See: K-5, K-6, K-7, K-9, M-8 [FEMA, NOAA, NMFS, EPA, USACE, states]	*From an implementation perspective, it is not feasible to enforce ESA compliance on a permit-by-permit approach. At the same time, it is a core principle of law as a result of National Environmental Policy Act (NEPA) that there be coordination and compliance with environmental laws, which can be done with a programmatic approach. Furthermore, policies and programs, such as CZMA, CELCP, and NERRS, are designed to protect, enhance, and balance competing interests in the nations coasts must be integrated into all ongoing flood risk management efforts.*
D-6 Require that every participating community in the NFIP must either have the designated local floodplain manager or at least one permitting staff as a Certified Floodplain Manager (CFM). Update 44 CFR 60.2, Minimum Compliance with Floodplain Management Criteria, to require the permit issuer be a CFM. See: Q-7, P-7, and P-11 [FEMA]	*The CFM program has done much in the past 15 years to increase NFIP knowledge and compliance throughout the nation. This is especially evident in the post-disaster environment. Programs with CFMs will likely recover more consistently, compliantly and quickly. Currently, four states either require a CFM or have a Continuing Education Credits (CEC) requirement for floodplain managers. There are about 9,200 CFMs in the country.*
D-7 Revise the NFIP regulations to require mandatory training for surveyors, engineers or	*Other professions develop and/or certify information related to development in flood hazard areas. Yet*

architects who are authorized by state law to perform work (e.g., elevation certificates, Letters of Map Change (LOMC), etc.) related to NFIP and to obtain a minimum number of continuing education credits on a regular basis if not already a CFM. See: P-9, O-13, E-5 [FEMA, States, ASFPM and ASFPM chapters]	*consistent knowledge of floodplain management standards among these professionals remains elusive. ASFPM should work with FEMA as well as licensing entities to establish a minimum CEC requirement for these allied professions.*
Changes/Updates to 44 CFR 60.3 (NFIP Floodplain Management Criteria for Flood-hazard areas)	
D-8 FREEBOARD a) Require a minimum of 2 feet of freeboard above BFE for new construction in riverine areas and 3 feet of freeboard in coastal areas. b) Consider extending the freeboard standard horizontally beyond the SFHA to protect development just outside the line and to discourage basements below BFE in these residual risk areas. See: O-1, M-15 [FEMA, MitFLG, state and community NFIP partners]	*ASCE publication 24-14 (ASCE 24-14) and the incoming IBC will, for the first time, require a freeboard for all new construction in the floodplain, with a higher freeboard for critical facilities. However, due to watershed development and climate change, increases in extreme weather events and sea level rise, higher freeboard is needed to reduce the increased cost of flood insurance and provide for public safety.* *The 2006 American Institutes for Research (AIR) report on NFIP building standards said the following about freeboard: "For the residential buildings analyzed, the cost of adding freeboard or installing a more flood-resistant foundation at the time of construction is modest (.25% to 1.5% of building cost per foot of freeboard except for fill foundation which is .8% to 3%/foot) but the benefit of doing so can be great, particularly in coastal areas subject to wave effects and riverine floodplains with small flood hazard factors. Incorporating freeboard and/or changing the foundation type would also help to reduce future flood damage resulting from sea level rise and erosion in coastal areas, and from development impacts in riverine areas. Under the current flood premium rate structure, flood premium discounts will be sufficient to recover the incremental costs borne by property owners to incorporate freeboard at the time of initial construction – in just a few years' time for most buildings."* *Factors to consider:* *1) The relatively small incremental costs to include up to 3 feet in elevation, and* *2) The affordability of flood insurance as the program moves to more accurate actuarial rating, an aggressive freeboard is as much about saving on future flood insurance premiums as it is a higher safety factor. Examples: 2 feet of freeboard equals roughly 40-60 percent premium reduction, 3 feet freeboard is 50-70 percent premium reduction.*

D-9 CRITICAL FACILITIES a) Do not allow new critical facilities in high-risk flood hazard areas (as defined by ASCE 24-14) or 500-year floodplain unless it is clearly a necessary functionally dependent use. b) Require redeveloped, substantially improved or new (functionally dependent) critical facilities to be elevated to the 500-year flood elevation plus freeboard to account for future conditions, or the historical flood of record, whichever is greater. c) Ensure that access and operability of the critical facility during the 500-year event or have a viable continuity of operations plan (COOP) where this is not feasible. Ensure that an updated COOP/operations plan is on file with the local floodplain manager, mayor, etc. and is exercised on an annual basis. See: G-6, O-2 [FEMA, MitFLG, all agencies]	*The concept of critical facilities protection has been around for more than three decades, but many critical facilities get damaged from flooding at significant taxpayer expense. In addition, the community and citizens suffer greatly when critical facilities like hospitals, shelters, fire and police stations, water and wastewater treatment facilities are not operational or accessible during large flood events.* *EO 11988 requires critical facilities to be protected to the 500-year flood or flood of record, whichever is greater.*
D-10 FLOODWAYS a) Use the full conveyance floodway that allows no rise, no velocity increase floodway, and ensure development will cause no adverse impact on other properties (apply this no-rise to LOMCs and LOMRs also). No development would be allowed to create a rise in flood elevation without compensating those impacted or mitigating the proposed impacts. b) When full conveyance floodways are not adopted, the higher flood elevations calculated for the "with floodway" condition in the flood insurance study floodway data table should be designated as the regulatory BFE for that community; and the community should be required to obtain easements from all existing development that is impacted by the resulting increase in flooding. Until the standard in (a) is in place, the NFIP should designate the BFE calculated for the "with floodway" conditions as a minimum national standard c) No new or substantially damaged/improved habitable structures should be allowed in the floodway. d) Any development in the floodway should not be allowed to cumulatively increase flood elevations, floodwater velocity or reduce floodwater storage	*The policy to not increase adverse flood impacts on others is based squarely on fairness to all landowners, land users and occupants, and on public safety and protection and maintenance of important and valuable floodplain functions.* *This will ensure new development does not result or cause an increase in flood elevations. Whereas the current practice of permitting development in the natural floodway results in higher flood levels for numerous property owners without their consent. Such actions impact the property rights of those impacted unless easements are purchased.* *The floodway is the most dangerous part of the floodplain and the goal should be to avoid/remove all habitable buildings for life safety and disaster cost reduction.* *We have got to end the current regulatory loophole where buildings can be rebuilt in a floodway if the "footprint" of the building is not increased. This provision would prevent the BFE from increasing and avoid transferring the responsibility from those who cause the problem to those who suffer the consequences* *Currently, most no-rise certificates do not accurately identify the increase caused by cumulative floodway development, resulting in floodway development that is*

e) Provide and enforce clear guidance on how "no rise" certificates will be calculated in order to be approved. See A-6, N-2 [FEMA, MitFLG, NFIP partners]	*adversely impacting other properties and raising flood elevations.*
D-11 SUBDIVISIONS & LARGE SCALE DEVELOPMENT a) For any subdivision or large scale development where detailed flood data does not already exist – require the applicant to develop BFE and floodway data for such areas or any other area on the development site where a mapped stream coming from any federal source exists that do not have an associated mapped floodplain. Show the boundaries on the plat (where required). b) In the configuration of the subdivision or large scale development require that for each lot, the entire building envelope must be placed on natural ground that is higher than the BFE. c) Reduce the five-acre and 50-lot threshold for subdivisions and large scale development in 44 CFR 60.3 to two acres and five lots or a subdivision that is defined in state law or by local ordinance, whichever is more stringent. d) Require that all newly-platted subdivisions clearly identify all known flood hazards and hazards that will exacerbate flood damages (e.g. subsidence, erosion, dam or levee failure, sink holes, wildfire burn scars, etc.). e) Require improved stormwater management standards for all new subdivisions and large scale sites that address lower frequency events (50- or 100-yr events vs. 2-5-yr events) and address how that water will be handled. See: L-2, L-4 [FEMA, state and community NFIP partners]	*This is the one area where the 44 CFR 60.3 standards of the NFIP are a total failure and could be improved significantly. With some work, it is also the area that could result in better implementation of the unfulfilled intent of the NFIP: To steer development away from high flood hazard areas. This is most efficiently done when land is first considered for development, long before a structure is ready to be built on the property. By then it is too late to effectuate development on safe locations.*
D-12 Require cumulative substantial damage or improvement (SI/SD) over the life of the structure. [FEMA, state and local NFIP partners]	*This provision is used in many communities and must become a national standard in order to upgrade buildings that are at the most risk.*
D-13 Require buildings in coastal A Zones to be designed and constructed to V Zone standards to be more resistant to coastal flood forces. See: A-13, A-14 [FEMA]	*FEMA's building performance teams have consistently found significant damages in these areas after a flooding event and have recommended V Zone standards be used. The most recent version of ASCE 24-14 essentially treats coastal high hazard areas and coastal A Zones the same for the purposes of building and construction standards.*
D-14 Require flood proofed buildings have approved operations and maintenance plans on file as part of	*Recent changes in the NFIP by Congress have led to more documentation and verification of flood protection upon*

the permit requirements and ensure they are updated annually. [FEMA]	*renewal of policies. This benefits the property owner as well as the emergency manager/first responders in the community.*
D-15 In areas where BFEs are established but no floodways are designated rewrite and issue guidance to simplify and standardize compliance with 44 CFR 60.3(c)(10), which requires consideration of cumulative impacts of development on flood elevations. See: A-6 [FEMA]	*44 CFR 60.3(c)(10) has been one of the most difficult standards to implement because it basically requires an impact analysis for every single development activity. This requirement has cascading impacts, including reluctance by FEMA and the community to publish BFEs where floodways have not been established. A more easily implemented standard would facilitate more widespread use of BFEs. Such an approach should allow for an easy to implement measure in lieu of an engineering study for every development activity (e.g., a setback).*
D-16 ENCLOSURES BELOW BFE a) Incentivize communities to perform periodic physical inspections where permitted by law and maintain records for structures with enclosures below the lowest floor or areas that could be easily converted to enclosures. This must be completed at the point of sale or when a building permit is issued. b) Incentivize non-conversion agreements to be filed with a local community's Register of Deeds and cross-reference to the Deed of original conveyance for permits involving buildings below the BFE to ensure that such buildings will not be converted to human habitation or other non-storage uses. [FEMA, state and community NFIP partners]	*Illegal conversion of areas below the BFE into living space continues to be a problem, especially in high hazard coastal areas. It is also an issue in large storage building in SFHA.* *The policy would limit high flood risk storage building conversions to residential or commercial uses in order to foster public safety and taxpayer savings.* *NFIP regulations and local ordinances should require this.*
D-17 FILL STANDARDS a) Prohibit the use of fill for triggering LOMC. b) Revise NFIP minimum standards and compensatory storage and conveyance to require engineered fill standards for all fill in the floodplain. See: K-8, E-6 [FEMA, state and local NFIP partners]	*The use of fill may be considered an acceptable elevation technique, but not justification for a LOMR. In practice, almost the only reason a Letter of Map Revision based on Fill (LOMR-F) is sought is to remove the mandatory flood insurance purchase requirement.* *Instead a more reasonable approach is that an applicant could apply for and receives a letter of mandatory purchase review (or refine the Letter of Determination Review (LODR)). A professional engineer or other qualified expert could evaluate the fill against some standards such as: 3 foot (or more) above BFE, 2 foot (or more) above 500-year, contiguous to lands outside of the SFHA (so FEMA quits approving islands in the middle of*

	the floodplain), adequate protection against erosion, etc. Review is done by certified professional, accepted by a lender if they choose, and is a private transaction among the owner/developer certification professional and lender at no cost to the NFIP or government. *Minimum NFIP standards do not have specific requirements for fill. The old LOMR-F form used to have standards for compaction, materials, drainage, etc. and compliance certified by a design professional. Now, those standards are buried in Technical Bulletin 10-01 (TB 10-01) pps. 15-16. However, FEMA has tied these standards to a general review requirement that a development be "reasonably safe from flooding" versus requiring it in local codes. This does not work.*
D-18 Regulate known erosion zones using appropriate setbacks/buffers based on future conditions that reflect the expected useful life of the building newly constructed or substantially improved. See: A-8, A-9, K-10 [FEMA, state and community NFIP partners]	*More recent flood events in Vermont and Colorado show erosion zones are a significant issue for public safety and taxpayer funding for disasters.*
D-19 Regulate residual risk areas (including those downstream of dams) by establishing minimum land use standards appropriate to ensuring losses are minimized and/or risk is not further intensified. At a minimum, apply approximate A Zone standards to new development and substantial improvement and any zoning codes in effect downstream of dams should assure no intensify risk in the dam inundation/failure area. See: A-9, H-20, J-2, E-1 [FEMA, state and community NFIP partners]	*Downstream of dams, there is often no regulation of the dam failure area, so risk intensifies, which in turn requires costly upgrades to the dam because it becomes a high hazard dam. Wisconsin requires zoning of the failure area in order for the dam to be classified as a low hazard dam. Such land use standards protect property owners/buyers and dam owners, and well as the taxpayers.*
D-20 NATIONAL LEVEE SAFETY GUIDELINES a) Activate the National Levee Safety Committee (NLSC) of federal agencies, state and local stakeholders, professional associations, and experts to develop consistent guidance for levee siting, design, construction, operating, and management standards, to enhance levee performance, set appropriate protection levels, and to build-in resilience and adaptability for existing and future levee-based systems. b) The guidelines should include standards to ensure the resiliency and integrity of the structure in the case of overtopping or under extreme conditions.	*The 2014 Water Resource Reform and Development Act (WRRDA) requires USACE to establish a National Levee Safety Committee to develop voluntary national levee standards. FEMA and other federal agencies need to be involved, as well as states and other levels of government. NFPPR is coming out at a very good time with the opportunity to provide some policy commentary as these standards are developed.* *Levee owners and communities need guidelines so they can protect their citizens and taxpayers from future catastrophic costs. Appropriate standards will also encourage private sector investment in properly built, operated and maintained infrastructure like levees.*

c) The guidelines should include recommended standards for managing residual flood risk and the intensification of flood risk. d) Congress and the administration should adopt a policy that the 500-year level of protection is the minimal design standard for all structural flood protection measures for the purposes of flood insurance and other federal investment. e) The NFIP should grandfather existing accredited levees for a 10-year period that provide between 100- and 500-year protection based upon current and estimated future conditions hydrology. See F-11, H-13, H-20, H-17, H-10, J-2, E-1 [USACE, FEMA, states, communities]	*It will be important to grandfather levees with 100- to 500-year protection and develop mechanisms for levee districts/owners to upgrade to 500-year protection in a specified time frame.* *FEMA and USACE should develop models and mechanisms to help levee districts upgrade those structures to 500-year protection, and require monitoring and annual reporting of progress toward such upgrades.*
D-21 Revise the NFIP regulations to include identification and management measures for hazards that increase flood risk (subsidence, erosion, closed lake basins, frazil ice, ice jams, tsunamis, debris flow, wildfires and mud slides). See: A-8, A-9, K-10, M-13 [FEMA, state and community NFIP partners]	*While not all flood areas are subject to subsidence, there are many areas where subsidence will combine with sea level rise or increased flooding, which contributes greatly to flood risk, damages and taxpayer costs. Same is true of the other unique hazards. CRS could consider ways to credit communities for some of this also.*

Subsection E. Flood Insurance – A Vital Tool for Reducing Flood Risk

Recommendation	Explanation/rationale
Insurance and Mapping	
E-1 INSURANCE RELATED TO MAPPING Require mapping of all related flood-risk areas, and include it in the mandatory purchase requirement, moving to full actuarial rates: a) Coastal Zone A – require mapping the LiMWA and either create a new zone (e.g., AC) or provide a surcharge in the storm surge zones. b) Erosion zones – already a zone designation (E); create rates and make it a mandatory purchase zone. c) Behind levees (and other structural projects) – stop the use of Zone D and replace with a new zone designation such as AL that would carry appropriate rates. d) Dam inundation zones – require the mapping of these areas and the mandatory purchase of flood insurance (e.g., create a new zone like AD; perhaps have similar rates as Preferred Risk Policy (PRP)). e) Change the zone designation of any mapped moderate risk flood area (e.g., Zone B, shaded X) not described above have its designation change to something like AM. f) Create a surcharge for buildings in the floodway once they have two paid claims of more than $1,000 each. See: D-1, D-19, D-20, H-20, A-13, A-14 and M-14 [FEMA, mapping and insurance partners]	*Research shows that people think they (and their property) have little flood risk even though their community may have a risk of flooding. FEMA's national marketing campaign attempts to shift that attitude, but it's a problem, especially in areas where risk is not being properly identified on flood maps.* *a) Research and post-storm analysis shows that greater damage occurs in the 1½- to 3-foot wave zone. NFIP building requirements should address this risk and insurance rates should also reflect this risk.* *b) Erosion zones – map as SFHA.* *c) Levees overtopped and fail, so the risk is real. The use of Zone D should not be used as there are no building or insurance requirements.* *d) Like levees, there is a risk of dam failure resulting in catastrophic damage.* *e) Statistics show that nearly 25 percent of all flood claims are in B/C/X Zones. Where the Zone B or shaded X is mapped, flood insurance should be required (and new maps show it as a moderate risk zone).* *f) Buildings in the floodway are at a higher risk than others; however, there is no rating differentiation between the two. On the insurance application, it should be captured that it is in the floodway.*
Rating for Flood Insurance Premiums	
E-2 MOVE AWAY FROM SUBSIDIZED RATES a) Ensure the movement towards premiums being based on actuarial rates (including future conditions) continues, for pre-FIRM subsidized rates and grandfather rates where losses have occurred. b) After the second paid claim of more than $1,000 on a pre-FIRM building (not already on a 25 percent annual rate increase path), or on a grandfather-rated building, rates for those structures would increase at 25 percent a year until they reach full-risk rates, or c) Give the FEMA administrator authority to require mitigation if more than x claims or y $ on a given building.	*With the program in debt $24 billion, the drain on reserves and program income needs to be reduced and eventually eliminated. While the reform legislation helps with that, additional teeth are needed. If a building with a subsidized premium not at 25 percent/year increase continues to have losses, it should at least be put on the same path as the maximum increase already provided by Congress (25 percent).* *The number of repetitive loss structures continues to increase despite mitigating thousands of buildings. Stronger measures are need to save taxpayer money for disaster relief and NFIP debt.*

See: H-13 [Congress, administration]	
Lender Compliance	
E-3 STRENGTHEN LENDER COMPLIANCE a) Identify a lead regulator with responsibility to coordinate with other regulators on cross-cutting compliance issues such as publication of mandatory purchase requirements, establishing a process for evaluating private sector equivalent flood insurance policies, etc. b) Perform an annual sweep of NFIP policies with the lenders' book of business. [federal lender regulators and FEMA] c) Publish an annual report to Congress of lenders who have been out of compliance, cause of their non-compliance, fines paid, and corrective action taken. d) If no flood insurance is in place and it was required, the responsible federally-regulated and insured lenders must pay the flood loss up to the replacement cost of the home or commercial structure (or up to the maximum limit). e) On the buildings in (d), no future disaster assistance due to flooding will be paid on items that would be covered by a flood insurance policy if a policy should be but is not in place. f) Require flood insurance equal to the replacement cost on any structure outside the SFHA for which two or more damage claims or federal disaster assistance have been paid due to flooding unless it is mitigated. g) FEMA and the SBA need to develop detailed tracking and enforcement of required flood insurance after Group Flood Insurance Policies expire and during the life of a SBA disaster loan, respectively. See: G-3 [FEMA, lender regulators, such as FDIC, etc.]	*Lender compliance still appears not be near 100 percent. While additional penalties were put into lender compliance, additional action is needed.* *a) None of the lender regulators are stepping up, so it is not surprising policies are illegally dropped.* *b) There has to be a way for FEMA to match their NFIP policy data base with lenders data base to see which don't have coverage as part of an audit.* *c) Congress needs to know how well their legislation is or is not working and be able to call the violators on the carpet. Lenders need to be held accountable. In addition, if the "shame" list is public enough, lenders will not want that visibility.* *d) And e) the untold story of Hurricane Katrina was not lack of flood insurance, but who was not fully insured, thus pushing the costs on to taxpayers for disaster relief. This would make it the same as private insurance for homeowner's policies.* *f) Map MOD provided nearly a nationwide database of digitized maps, but very few detailed engineering studies so many community maps still show properties at moderate-low risk that are actually at high-risk. Consequently, if they are repeatedly flooded, they should be required to carry flood insurance so the taxpayer doesn't continue to carry the burden.* *g) Per a study performed by Xtria for FEMA in 2007, neither the NFIP nor SBA track flood insurance on disaster loans or post-Group Policy expiration. As a result, those who didn't have the required coverage, even though it is supposedly prohibited, received aid or loans the next time they were flooded to cover what a flood policy would cover.*
Increased Cost of Compliance Mitigation-part of Insurance Policy	
E-4 IMPROVE THE USE OF INCREASED COST of COMPLIANCE (ICC) a) Increase limits (cap) of ICC funding and expand eligible activities that qualify for ICC. b) ICC coverage should be paid over and above the maximum policy limits if the policy is for the max.	*a) $30,000 no longer covers the cost of mitigating many homes that are substantially damaged. The cap and eligible activities get accounted for since projects must still be cost effective.* *b) FEMA currently does not pay ICC if total claim exceeds max limit. ICC should not be considered part of the policy coverage.*

c) Implement "Door #4" option from National Flood Insurance Reform Act (NFIRA) (2004 NFIP Reform Act)--where ICC is to be available for use in any mitigation programs. d) FEMA should release online an annual report on the use of ICC, detailing the funds expended and how they were used. e) The per policy fee charged to pay for keeping grandfathering in the 2014 NFIP reform should go into ICC to pay for more mitigation, and FEMA should also increase the ICC premium charge closer to its statutory limit of $75 (it now averages under $15 per policy)-- to pay more for mitigation. f) Expand outreach to the public, adjusters, insurance agents and local officials about repetitive losses and substantial damage and how ICC can be a most effective tool to mitigate the flood risk and result in lower insurance premiums. See: E-7, F-6, F-14, E-8 [FEMA]	*c) ICC needs to be applied fully as directed by Congress in NFIRA (previous NFIP Reform).* *d) An annual report on how ICC is being used, where it is used and how much of the funding is being used (and leveraged to support other mitigation grants) would show its benefits (or causes, if not being used).* *e) ICC is the fastest and most effective way to assist homeowners to recover after a flood. It must be funded, encouraged and fostered. Use of ICC in cost effective mitigation projects will save the Flood Insurance Fund more than it costs the fund* *f) There is still a lack of knowledge and coordination between adjusters, insurance agents/WYOs and local community officials about the triggers, use and benefits of ICC after a flood*ing event.
NFIP Training on Flood Insurance Program	
E-5 IMPROVE TRAINING OF AGENTS a) Significantly expand online and in-person insurance and real estate agent and adjuster training provided by states and the NFIP training contractor. Expand the number of courses and topics and also incorporate floodplain management, flood mapping familiarity, and mitigation. b) Encourage all states to require at least three hours of continuing education for license renewal by end of 2016 for those states that don't already require it. See: D-7, P-9, O-13 [FEMA, states, ASFPM chapters, Congress]	*While FEMA has expanded online training, the course selection has been limited. Now, with FEMA's plan to stop providing all instructor-led training by the NFIP training contractor and provide only on-demand, non-interactive training for agents and any other interested party, there is even a stronger concern of increased misinformation, mis-rating and increased confusion among FEMA's key stakeholders. More training to relevant and current issues is needed (i.e., legislation changes, ICC as speediest mitigation option, all mitigation options, non-regulatory products like depth grids, changes since last FIRM) as well as in-person classroom instruction courses. Without this, property owners receive conflicting information. Better internal FEMA training of the region and the Bureau and Statistical Agent (B&SA) field representatives is also needed.* *Congress needs to direct FEMA to work with state insurance groups like the National Association of Insurance Commissioners (NAIC), and National Conference of Insurance Legislators (NCOIL) to encourage the licensing requirement more uniform and required for renew as well. For some states, the licensing requirement is to take a flood course just once.*
Incentives to Maintain Policies	
E-6 LOMR, LOMR-F PROCESS AND REQUIREMENTS Encourage property owners to continue coverage after receiving a LOMR-F and not be allowed to	*A separate mailing should be sent to the LOMR policyholder explaining the risk has been reduced, not removed; the importance to continue coverage; and how they can convert*

build below the BFE (e.g. basement) after receiving a LOMR-F. a) Policyholders should not be allowed to drop their policy until its next renewal; could be converted to a PRP for the current term. b) Anyone issued a LOMR-F must obtain and maintain a deed restriction of the parcel indicating it had been previously mapped as SFHA and that flood insurance should be obtained, or alternately, do not allow a basement or any other addition below the BFE. See: G-3, D-17 [FEMA, state and local NFIP partners]	*their existing policy to a PRP. They should then sign a declination form stating they no longer wish coverage.* *At a cost of millions of dollars, FEMA issues more than 10,000 LOMAs and LOMR-Fs a year, which acts like a "Get Out of Flood Insurance Free" card, so people drop their policy because they feel that (inaccurately) the risk has been removed. They also are now free to build as they want, despite the residual risk.*
Flood Insurance Rating and Affordability	
E-7 MODIFY RATING AND AFFORDABILITY MEASURES a) Develop a more refined insurance rating structure that includes, among other things, rating factors such as location relative to more frequent floods, depth grids, premium credits for partial mitigation, including crediting measures for historical or other difficult to move/mitigate pre-FIRM structures. b) Identify and implement affordable flood insurance payment support and methods for those who truly cannot afford a policy (fixed- and low-income property owners) (e.g., means tested vouchers). c) Premium assistance should be short term, with more emphasis on providing low cost loans so the building can be mitigated, with the subsidy used to pay off the loan. d) Eliminate the new fee established under Homeowner Flood Insurance Affordability Act (HFIAA) 2014, which charges an additional amount on each policy of $25 or $250, or the fee should go into ICC to pay for more mitigation or to pay for mitigation otherwise. See: F-4, F-6 [Congress, FEMA, NFIP partners]	*a) The NIFP has used the same basic process to rate premiums for 45 years. The National Academy of Sciences has done studies for FEMA on how to improve premium rating. With today's computing power and added data that has been collected on the structures, the rates can be more individualized and refined.* *b) These should not be limited to pre-FIRM property owners, but also those who have an expiring Group certificate, possibly affected by a map change, or other scenario that results in unaffordable premiums for the lower income property owners.* *c) Cost effective mitigation will protect lives and property and greatly reduce flood insurance premium so it is affordable. It also means the subsidy goes away when the mitigation loan is paid.* *d) The HFIAA fee is charged on subsidized and non-subsidized policies, so those with NFIP compliant buildings also pay a surcharge. It is $25 for owner occupied and $250 on all other policies. The best way to help those with new higher premiums is to help them mitigate their building so the policy premium becomes affordable and they are safer.*
Insurance Claims Coordination	
E-8 IDENTIFY SUBSTANTIALLY DAMAGED BUILDINGS To address this issue, improve coordination between the claims adjuster and floodplain administrator. a) Provide access to FEMA's quick claims data to	*After a flooding disaster, community officials often are unaware that insured buildings have been determined to be substantially damaged by the claims adjuster.*

local community officials and NFIP state coordinator to identify potential substantially damaged buildings. b) Require sign off by community floodplain administrator of all claims over a certain threshold (e.g., 35 percent of assessed value) as part of claims processing for substantial damage determination and to ensure mitigation is used to help owners. See: B-4, F-15, E-4 [FEMA, claims adjusters, states, communities]	*Improved communications and coordination is needed between the claims adjuster and community official and eventually the property owner so the building is reconstructed to current community or NFIP standards. This will protect the owner, community and federal taxpayer.*
Elevation Certificates	
E-9 ELEVATION CERTIFICATE (EC) DATA a) Require an EC on all new floodplain building permits and require that the community must keep them and make it available (verify in Community Assistance Visits (CAVs)). b) Explore offering alternative for insurance rating that might instead use LiDAR that might be available in the data provided in the FIS metadata. See: B-5 [FEMA, states, communities]	*ECs are the best way to ensure insurance premium accuracy and equity, and to track community NFIP compliance.* *Obtaining ECs can be done inexpensively if done on a community/neighborhood basis (North Carolina has done it on statewide basis in the $25-$45 range). Using elevation data from LiDAR can be used in some low risk cases in place of an EC.*
Risk Communication and Marketing	
E-10 Continue marketing campaigns for purchase and renewal of flood insurance policies with target marketing towards homeowners without mortgages and in areas of low penetration. [FEMA, Mapping and insurance partners]	*Communicating flood risk is a continual process where FEMA needs to share a consistent message with other stakeholders to help carry the messages and material. When map changes are occurring, Write Your Own (WYO) insurance companies/agents need to be informed in advance of these changes, planned outreach events, etc.*
NFIP Policy Coverage	
E-11 Provide optional basement, Additional Living Expense (ALE) and Business Interruption (BI) coverages based on actuarial rates. [FEMA, using NAS studies to guide the effort]	*In an effort to more closely parallel a homeowner and business owner policy, these additional coverages should be provided as an option. In many parts of the US, families have furnished basements, yet most of what is there is not covered by an NFIP policy. ALE (and the business equivalent, BI) should be offered to help offset taxpayer funding through disaster relief.*
Alternatives to the NFIP	
E-12 ALTERNATIVES TO NFIP a) As outlined in HFIAA, explore how a community-based flood insurance program might be instituted. b) Continue to promote different ways private industry can participate in the flood insurance program (i.e., reinsurance, private insurance, and Terrorist Risk Insurance Act (TRIA) program.	*The NAS and another study are looking into the benefits and challenges of a community-based policy. The attraction is to tie community development decisions to the increase or decrease in premiums, since community, not individual decisions determine future flood risk in each community.*

See: O-15 [FEMA, NAS, states and communities]	
E-13 PRVATE INSURANCE AND RE-INSURANCE a) Fully evaluate and explore ways the NFIP can use re-insurance to cover extreme events or act as a re-insurer like in TRIA; and if it will be cost effective to the federal taxpayer. b) Ensure any use of private flood insurance programs must also have a means/funding to address flood mapping, floodplain management, incorporation of building codes, regulations, and Flood mitigation aspects currently in the NIFP. c) Encourage insurance and re-insurance industry to rate flood coverage as part of homeowners policies, with incentives for appropriate mitigation actions. d) Consider an NFIP/private partnership where NFIP policies would only be available in the SFHA, and properties outside the SFHA could only buy insurance from the private sector. See: O-15, O-17 [Congress, FEMA, insurance and reinsurance sector]	*The private reinsurance market indicates it may have the capacity to re-insure the NFIP. Options to cover those events usually include some backstop such as the federal government covering losses over some very large number—perhaps a three tier system.* *Collect and analyze data on where flooding occurs and expected annual damages for building so the private sector may have the data to cover flood. However, the catch is always extreme events.* *This would start to bring private sector insurance into the picture, and those outside SFHA who get repeatedly flooded would seek to be mapped and regulated in order to buy flood insurance—since private insurance may not insure them. While there may be pitfalls this is worth exploring.*

Subsection F. Mitigation & Risk Reduction to Reduce Long-term Taxpayer Costs from Flooding

Recommendation	Explanation/Rationale
Mitigation Planning	
F-1 STATE AND LOCAL MITIGATION PLANS Develop more holistic mitigation plans and provide valuable historical information with each plan update. Elements that should be added include: a) Ongoing educational/outreach programs. b) Post-disaster plan effectiveness/lessons learned. c) A state/local funding capability assessment and potential actions to address funding gaps. d) Assessment of future increases in risk (watershed development and climate change impacts). e) Explore a standardized comprehensive natural hazard resilience score (including flood). See: G-4, L-1, J-2, M-15, P-3, C-4, C-6 [FEMA, NOAA, MitFLG, states and communities]	*This would improve plan quality, provide a better guide to increasing resilience of their economy, and provide historical documentation of events and actions. This also adds important resilience elements to plans that are currently missing or under developed.* *A non-federal funding assessment will identify gaps. It will move away from the "I can't afford" it claim by communities and increase local responsibility.* *A resilience score would provide a better indication of how their decisions impact resilience over time. A score would also add long-term focus to the plans that should be looking to at least the year 2100 (this is not CRS, but could be tied to CRS).*
Mitigation Grants	
F-2 STATE DELEGATION AND CAPABILITY BUILDING FOR MITIGATION Expand state capability for continual mitigation by: a) Extending delegation of oversight of HMGP, Flood Mitigation Assistance Program (FMA), and Pre-Disaster Mitigation Program (PDM) to all qualified states. b) Developing a FEMA/state partnership program for state hazard mitigation programs mitigation modeled on the CAP. See: P-3, O-6 [FEMA, states]	*This addresses the issue of state capability to routinely implement mitigation. It moves the authorized delegation program into implementation and will result in expedited mitigation. Initial pilot programs can utilize the USACE Silver Jackets program.*
F-3 Change the date for inclusion of eligible mitigation project costs under HMGP to the date of the disaster declaration. [FEMA]	*This would allow potential grant project costs to start immediately after the declaration date if states and communities choose to provide up-front funding, so it encourages state disaster reserve funding. This allows a project to be quickly completed and then the state or community partially reimbursed if projects are approved.*
F-4 HMA GRANT PROGRAMS Focus HMA mitigation options on nonstructural: a) Reverse FEMA's policy change on major/minor flood control that would fund major flood control projects and ensure Hazard Mitigation Assistance (HMA) grant funding is never diverted away from minor "nonstructural" mitigation projects to major flood control projects.	*Major flood control projects are then done by USACE, USDA, BuREC. FEMA doing this is duplication of programs and contrary to Stafford Act law. FEMA does not have the expertise or experience to review, oversee or ensure adequate construction, operation or maintenance of major flood control projects.* *This improves community mitigation and ensures major flood control projects don't lessen funding to more*

b) Give mitigation grant preference to individuals who use their flood insurance claim payment for mitigation. c) Broaden eligible mitigation options to include other building retrofitting measures that reduce flood losses. FEMA should provide technical information and financial incentives to encourage small scale retrofitting in appropriate cases. d) Make comprehensive/effective flood-warning systems eligible under PDM and FMA. See: E-7, O-1,O-2, O-11,H-3,I-2, M-1, M-3, M-21, J-2 [FEMA, states, administration, NSC, CEQ]	*effective and oversubscribed nonstructural mitigation.* *It is important to encourage people to use their insurance claim for mitigation, helps them and taxpayer.* *Some retrofitting and flood warning systems can reduce losses and disaster relief costs. Such projects must still meet Benefit-Cost Analysis (BCA) requirements.*
F-5. INCENTIVIZE STATE MITIGATION ACTIONS Use sliding scale for post-disaster cost share in mitigation programs like HMGP. Consider: a) Standard mitigation plans at 15 percent HMGP and enhanced mitigation plans at 20 percent HMGP. b) Higher federal cost share for going beyond the IBC and NFIP regulations. c) Higher federal cost share for freeboard, higher floodway standards, prohibitions on filling, etc. d) Only provide the base level or lower federal cost share for states and communities that have not demonstrated some level of sustained mitigation capacity/funding over the preceding five-year period. See G-11, O-6, P-3 [FEMA, states]	*It is important to reward states that have opted to create and implement an enhanced all-hazards mitigation plan.* *Strong state mitigation plans and programs are the key to increasing and streamlining mitigation and thus reducing taxpayer costs for disasters.* *Some states have state funded cost sharing mitigation programs that work as compliment to FEMA FMA programs or can independently fund nonstructural mitigation for flooding.*
ICC-increased cost of compliance mitigation	
F-6 IMPROVE ADMINISTRATION OF ICC PROGRAM a) Modify ICC and HMGP to work together more effectively. b) Add the HFIAA policy surcharge fees and disaster assistance funds to the ICC program for insured homeowners and communities (via assignment of claim) to mitigate. c) Modify eligible costs under ICC and adjust policy fee accordingly to accommodate changes. I. Allow full costs associated with acquisition and relocation projects including for non-federal acquisition shares. II. Restrict eligibility for ICC elevation to heights less than 12-15 feet. d) Increase the amount of mitigation implemented by insured property owners by use of these measures: I. Increase limits (cap) of ICC coverage and allow a sliding scale to account for regional cost	*This partially addresses lack of timeliness of current HMGP, saves large administrative cost of HMGP, and further encourages purchase of flood insurance.* *Policy surcharge fees would increase ICC available funds, which is the fastest way to help homeowners mitigate following a flood. HMGP takes too long for many, so the opportunity to mitigate is lost.* *I – Allows properties to be quickly purchased at full market value and the land converted to open-space.* *II – Would address the issue of ICC incentivizing only elevation (in extremely high hazardous deep flooded areas).*

variation and inflation. II. Provide ICC over and above the maximum policy limits if the policy covers max. III. Allow the insured to purchase additional blocks of ICC coverage up to the limit of their policy or value of their home. IV. Implement "Door No. 4" option from NFIRA (2004 NFIP Reform Act)--where ICC is to be available for use in any mitigation program. e) Produce and release an annual ICC report on funds expended, mitigation implemented, and reserve balance. f) Expand ICC triggers. Insured should be able to trigger ICC with other means such as repetitive loss and severe repetitive loss status, substantial improvements, floodplain map zone or BFE changes, etc. See: E-4, E-7 [FEMA, state and community NFIP partners]	*d – This addresses issues within ICC program related to mitigation costs and lack of adequate funding for homeowners to mitigate in varying situations and locations. It also potentially increases ICC revenue.* *d IV – Door No. 4 triggers the availability of ICC upon an offer of mitigation from ANY mitigation program (e.g. HUD-CDGB).* *e – Ensures the ICC program is effectively utilized as an important federal mitigation program.* *f – Increases accessibility to ICC funds for mitigation at points in time where it is most desired and cost-effective. Projects must still meet BCA requirements.*
Non-FEMA Mitigation Programs	
F-7 Expand use and understanding of "environmental" benefits for nonstructural mitigation beyond the FEMA programs and BCA module. See: J-2, H-3, I-2, I-3, [USACE, USDA, HUD, EPA, MitFLG]	*This could allow for nonstructural mitigation funding in locations where state or local jurisdictions have been mapped and are regulating other flood hazards (riverine erosion, mudslides, ice jams, etc.).*
F-8 Increase funding for existing USACE nonstructural programs and remove PL 84-99 language that implies USACE will only evaluate and compare nonstructural alternatives when requested by the non-federal project sponsor/owner. See: H-18 [USACE, administration, Congress]	*The authorization for USACE to evaluate all alternatives actually exists for work under PL 84-99, but is too often ignored or misunderstood. USACE should always look at, evaluate and compare nonstructural alternatives in any project.* *This would address two major impediments to USACE considering nonstructural mitigation.*
Mitigation - Disaster Assistance & Recovery	
F-9 CREATE ADDITIONAL MITIGATION FUNDING OPTIONS a) Create a new low cost loan program (or leverage an existing one like HUD, SBA, etc.), to ensure all homeowners and small business owners have access to mitigation funds, which can be paid back over time. b) Provide a full suite of non-FEMA federally-declared disaster recovery funding programs (HUD, USDA, SBA and others) to provide consistent/steady mitigation funding nationwide. See: J-1, M-3, G-5, Q-3, Q-5, Q-11, Q-13, Q-14, O-3, P-4 [Administration, Congress, MitFLG]	*Nonstructural mitigation provides a 4:1 or better benefit to the nation for every dollar spent.* *Often, owners who desire mitigation, and are willing to pay for it (typically because the return on investment is positive), don't have the financial resources to pay up front, but could pay off a loan over time.* *Institutionalizing non-FEMA mitigation programs would prevent uneven federal financial disaster recovery support due to sequestration or lack of will to fund programs such as HUD's Community Development Block Grant Disaster Recovery Program (CDBG – DR) or USDA Emergency Watershed Protection Programs (EWP).*

F-10 Deploy nonstructural mitigation workshops in disaster areas during the initial recovery phase and focus homeowner mitigation techniques on nonstructural and nature based approaches. See: G-5 [FEMA federal coordinating officers, USACE, states]	*We must institutionalize USACE floodproofing workshops that were done after Sandy. But get them there within weeks of the event before homeowners fix their damaged building without doing mitigation because they did not know the options or how to do it.*
F-11 ELIGIBILITY CRITERIA FOR FEDERAL FUNDING To be eligible for flood mitigation and associated flood disaster assistance communities and states must: a) Participate in NFIP and be enforcing minimum regulations. b) Have and implement minimum design standards for infrastructure vulnerable to hazards. See: J-2, G-4, O-1, O-3, H-10, H-20, D-20 [MitFLG, FEMA, CEQ, NSC]	*This addresses the issue of communities having growth and development with no standards and getting federal dollars to recover again and again.* *These criteria should address use of LID, GI and NAI approaches to risk management.* *Infrastructure standards are important because most disaster funding goes to rebuild infrastructure, not to homes.*
Mitigation Tools & Data	
F-12 Develop open-source tools for post-flood damage estimation to better inform post-disaster mitigation strategies. See: O-2, I-3, K-1, K-3, H-9, H-17, L-1, L-4, [FEMA, MitFLG, states]	*This must include program/technical assistance, grant targeting, BCA support data, and review and improvement of local risk reduction policies.*
F-13 Continue to improve FEMA BCA module (which has direct implications for approval of mitigation projects) to include use of real in-time discount rates, updated depth-damage functions, a module for erosion/landslide risk, etc. See: I-3 [FEMA, MitFLG, FIFM-TF, States]	*This expands on the past BCA improvements FEMA has made. The desire is to make the BCA module reflect reality by accounting for mitigation benefits.*
F-14 Develop a web-based tool that allows property owners to compare the costs of various "mitigation options" and to compare the associated short- and long-term costs. The tool should account for things like implementation costs, estimated insurance costs/savings, possible grants, and Environmental and Historic Preservation Program (EHP) issues. See: I-3, E-4, E-7 [FEMA, MitFLG, states, NGOs]	*This will quickly provide return on investment calculations for mitigation, and streamline and institutionalize methods for delivering mitigation assistance. It also will encourage market-driven private-sector incentives for mitigation. If homeowners (and governments) have ALL the facts (short- and long-term) so they can make informed choices.*
F-15 Increase state and community partner accessibility to real-time GIS-based claims data for use by state and local officials in mitigation planning, recovery, and implementation. See: E-8, B-4 [FEMA]	*This addresses the issue of state/local partners not having real-time access to damage data that can aid in making the best long-term mitigation decision before repairs begin.*

F-16 REVIEW DISASTER AND MITIGATION PROGRAMS a) Periodically (3-5 years) conduct an independent evaluation of mitigation programs including PDM, HMGP, FMA to quantify their cost effectiveness in reducing losses and disaster costs. b) Expand FEMA's Building Sciences Post-Disaster Materials Assessment Teams work to more disasters from multiple hazards to increase knowledge of mitigation performance measures. c) Estimate the current cost to mitigate the nation to some cost effective flood standard (e.g.100-year). See: K-12, K-12, K-13, O-8, O-14, G-9, [Administration, MitFLG, FEMA, FIFM-TF]	*These items provide a means of learning lessons from mitigation. It would also provide some oversight of programs to provide adjustments and to inform Congress what is effective mitigation and what adjustments would benefit the nation.* *The estimate should separate the mitigation needs of buildings protected by structural measures.*
Mitigation Rules & Regulations	
F-17 Modify historic building exemption to NFIP rules and local ordinances to ensure utilities within the exempted facility are protected through BFE/Design Flood Elevation (DFE) requirements or some other method. See: D-1, [FEMA, National Trust for Historic Preservation, state and community NFIP partners]	*This would eliminate future insurance claims and disaster assistance to repair or rebuild the building or the utilities in historic buildings.*

Subsection G. Disaster Response & Recovery
Must be a Springboard to Sustainability

Recommendation	Explanation/rationale
Federal Disaster Assistance & Cost Share	
G-1 POST DISASTER MUTUAL AID Ensure that post-disaster interagency mutual aid efforts are structured to easily allow local floodplain management and flood hazard mitigation needs to be addressed. a) Explicitly allow substantial damage determinations and floodplain permit assistance to be eligible for reimbursement under Public Assistance (PA) which would make the Emergency Management Assistance Compact (EMAC) a more viable approach. b) Encourage all states to have laws that allow in-state mutual aid that addresses liability and credentialing of volunteers. c) Establish mutual aid programs for floodplain professionals within all ASFPM chapters. [FEMA, states, ASFPM chapters]	*Communities are often overwhelmed by the need to inspect and determine whether hundreds or even thousands of buildings are SD and to issue rebuilding permits after the disaster. The larger the disaster, the more difficult it is for the community to be able to do SD determinations and issue safe rebuilding permits, which is the first step in resilient community recovery and reduction in future taxpayer costs for damage to the same building next time.* *It is cost effective to the taxpayer to use mutual aid agreements to assist in SD determinations and rebuilding permits following significant disasters.*
G-2 Federal disaster assistance programs and mitigation programs should always require a cost share between federal, local and state government. There must be at least a minimal amount of non-federal cost-share to ensure state/local commitment to reducing the costs of future disasters. See: Q-1, O-15, O-16, I-1 [FEMA and other federal agencies]	*ASFPM has a core belief that floodplain management, and by extension disaster management/assistance, etc., is the joint responsibility of the federal, state and local level, as well as the individual who chooses to live or build at risk. Accordingly, all levels should contribute to their disaster recovery and to manage their flood risk.*
G-3 POST DISASTER ASSISTANCE (PA and IHP) a) Make PA grant eligibility contingent on NFIP participation and compliance and on maintaining flood insurance or proof of state or community self-insurance. b) Develop and ensure detailed tracking and enforcement of the requirement to carry flood insurance triggered by the acceptance by disaster assistance, including disaster loans (i.e., SBA), Individuals and Households Program (IHP) and PA funds post-event. c) Flood insurance waivers requested by state insurance commissioners for public buildings should never be approved by FEMA regional administrators as flood insurance through the NFIP is widely available.	*The Individuals and Households Program ([IHP], HMA, HMGP, PDM, FMA) grant eligibility is contingent on community NFIP participation, whereas PA is not, but should be in order to protect taxpayer funding/investment.* *Recent FEMA GAO and IG reports on disaster aid verification show inconsistency by FEMA and states in verifying whether IHP and PA applicants are really eligible for disaster assistance. The OIG report indicates that the problem may be worse for PA recipients.* *The FEMA regional administration can grant a waiver to the flood insurance requirement for a public building if the state insurance commissioner certifies insurance is not available for the facility. Instead, FEMA field insurance specialists are inappropriately granting such waivers, resulting in illegally paying disaster assistance time and again for the same building. These payments*

d) Deny flood disaster assistance to any building that has been granted a LOMR-F and consider denying assistance for all insurable losses for building in SFHA that can get insurance. See: E-3, E-6 [FEMA, SBA, HUD, Congress, states]	*have saddled FEMA and taxpayers with more than $1 billion in costs. (DHS OIG-15-19-D)*
G-4 DISASTER ASSISTANCE QUALIFICATIONS Make all federal agency disaster assistance contingent upon the community and state having a current hazard mitigation plan, building codes, participation in every available pre-disaster mitigation program for which hazards pose a significant threat in the plan, and: a) For flood prone communities, assistance should be contingent on NFIP participation, compliance, and maintenance of insurance for public structures in the SFHA. b) For small and under-resourced communities and tribes, ensure availability of technical assistance to initially help them with participation in the mitigation program(s). c) For all communities, consider limiting future federal disaster recovery assistance in areas protected by structural projects to only those buildings that are elevated above the 1 percent annual chance flood elevation (100-year flood elevation) in a community protected by the structural measures. d) Consider not providing Individual Assistance (IA) or PA disaster relief for any flooding in identified flood area (SFHA) See: P-2, P-5, Q-1, I-1, F-1, F-11, H-18 [FEMA and other federal agencies providing post-disaster resources, Congress, states, communities]	*Flood losses continue to increase. Disaster assistance has been identified by many policy experts as a primary driver to not changing behavior of communities and individuals to be more resilient. Before federal disaster aid is provided, communities should participate in all voluntary programs that help reduce the risk of a particular hazard to which they are vulnerable.* *Furthermore, ensure that monitoring and penalties for non-compliance are tied to disaster assistance cost share. The 94 percent of the population that does not live or build at risk pay much of the flooding costs for the 6 percent who do live at risk. The 94 percent need to educate their members of Congress.* *Federal taxpayers should provide less assistance to those states and communities that do not take simple and reasonable steps to reduce the costs and suffering from predictable natural hazards.* *The current policy of providing disaster recovery assistance to all properties, regardless of their elevation in relation to the BFE, undermines communities' incentive to mitigate existing and future development in areas protected by structural measures because they can collect tax revenue from the development, but externalize the consequences to the federal taxpayer.*
Post Disaster Mitigation	
G-5 IMPROVE THE CAPACITY OF THE DISASTER FIELD OFFICE (DFO) TO DELIVER MITIGATION PROGRAMS TIMELY AND EFFECTIVELY a) Improve the efficiency and delivery of HMTAP by allowing Federal Coordinating Officers (FCO) to approve requests consistent with the state's mitigation strategy rather than have to wait for FEMA Regions or FEMA HQ. b) Require FCOs to be trained in mitigation programs and include mitigation program delivery goals as part of their personnel evaluations. c) Ensure that disaster field office operational goals equally value the effective delivery of hazard	*DFO operations are inconsistent and generally provide poorly timed and/or inadequate mitigation resources. The operational goals of DFOs and FCOs typically are to close the facility as fast as possible and do so with as little cost as possible. There are several improvements that can be made to make mitigation program delivery more successful.* *An example is getting the State Coordinating Officers (SCO) and FCO to support the quick delivery of USACE nonstructural mitigation workshops for impacted property owners and communities so they understand the full range of mitigation options and know how to determine return on investment in selecting their best mitigation option, taking into account long-term costs, including future flood*

mitigation programs as well as disaster recovery programs. d) Study and develop consistent national minimum recommendations for mitigation program staffing at disaster field offices. e) Establish a goal and plan/process for supplementing state capacity for the expedited acquisition of flood prone buildings within six months of the flood event if a state includes acquisitions as part of its mitigation strategy. f) Require that for every PA project worksheet that at least one mitigation measure is identified, regardless if it is eligible for PA funding, and require that such data be shared with the property owner and community. g) Ensure that all disaster field offices have capability to analyze existing flood hazard data and develop Advisory BFEs to guide rebuilding. After every significant flood, collect high water marks, calibrate the flood model and reissue new maps where significant changes result. See: F-10, F-9, O-7 [FEMA, states]	*insurance premiums.* *Building state capability to handle most flooding (and most are not extreme events) is one of the most effective means of reducing costs for all taxpayers from flooding. National standards and effective plans and processes are necessary to achieve this goal.* *The first step to make Section 406 (PA) mitigation successful is to write up mitigation measures as part of the project worksheet process. That also means knowledgeable mitigation staff must be embedded into PA-PW teams.* *g) Use disaster funding to perform this work and determine if BFEs should be developed in all areas where existing flood data is insufficient and/or outdated.*
G-6 PROTECTING FEDERAL INVESTMENT Work with all federal agencies to ensure post-disaster policies and programs are consistent in supporting long-term flood loss reduction, always consider nonstructural alternatives, include national resilience/sustainability goals, ensure consistency with the new Principles and Requirements (P&R), and factor in climate variability. a) Require that all PL 84-99 projects consider nonstructural measures first. b) Require all federal investments in rebuilding/reconstructing critical facilities be protected at least to the 500-year flood level plus account for impacts of future conditions including climate change. c) Ensure federal post disaster funding requires incorporation of GI, LID and NAI whenever possible to avoid repeated disaster relief. See: J-2, J-3, O-1, O-2, O-9, H-2, H-10, H-18, I-2, D-9, L-1, L-7 [FIFM-TF, MIT-FLG, USACE, FEMA, federal agencies]	*Recently, the White House established, as a matter of national policy, several directives towards resilience and sustainability. This will be a focus of agencies until at least the end of this administration, if not beyond.* *While PL 84-99 allows consideration of nonstructural alternatives and setback of levees, USACE has a culture of not considering those alternatives. A recent success after the 2011 floods on the Missouri demonstrated that setback levees can benefit the taxpayers and those in the "protected" area of the levee.* *See J-2 for explanation of Green Infrastructure, Low Impact Development and No Adverse Impact.*
Emergency Actions Must Cause No Harm to Others	
G-7 Ensure that actions undertaken pursuant to emergency action plans do not cause adverse flood	*When a portion of the levee in Cairo was blown up (Mississippi River in 2011) the properties that were flooded already had easements*

impacts on other properties in the community or other communities, or to natural floodplain functions and flood storage. [MitFLG, federal agencies, states, communities]	*that provided authority to flood them to prevent failure of the entire levee. Such foresight and thinking should go into all emergency protective measures. Entities undertaking protective measures will and should continue to be liable for damages that occur on other properties due to their actions as such events are predictable.*
Disaster Process, Analysis & Evaluation	
G-8 DISASTER DECLARATION PROCESS a) Reform the disaster declaration process to ensure that the threshold for a federal disaster declaration is truly based on exceeding state and local capabilities. b) Increase per-capita limits to account for inflation on an annual basis. [Administration, FEMA, Congress]	*Disasters are being declared at an ever increasing frequency and this is not necessarily due to the increasing frequency of events. Several entities have pointed to needed reforms in the process and that federal declarations often do not exceed state and/or local capabilities. There are too many federal declarations for small disasters that should be handled by the states and communities.* *Federal taxpayers should reward states and communities that are proactive in reducing the costs and suffering from predictable natural hazards.*
G-9 Establish an independent board similar to the National Transportation Safety Board, to investigate disasters; collect data; analyze the damages, causes and economic, social and environmental impacts; evaluate effectiveness of government programs and make loss reduction recommendations. The board's recommendations should be made public through a report for each event. See: F-16, B-4 [FIFM-TF, MIT-FLG, Congress]	*This is a recommendation that had been made by Bill Hooke with the American Meteorological Society and others like Gen. Gerald Galloway. This should be done for all disasters exceeding a certain threshold.*
G-10 Develop mitigation related metrics that are used to measure the success of a post-event disaster recovery to be used as an indicator of a successful disaster management and recovery. [FEMA, MitFLG, USASCE, NRCES, NOAA, DOT]	*The national mitigation framework exists as part of the national planning framework. However, what seems to be missing are performance metrics.*
G-11 POST DISASTER OVERSIGHT a) Develop an effective and expedient process in the post-disaster environment where FEMA and/or the state can review states and communities for compliance with NFIP requirements and quickly impose sanctions if necessary. b) Use outreach, monitoring, audits and other measures to enforce the NFIP requirement to identify and insure state-owned and locally-owned flood prone structures, with required pay back to the federal treasury and NFIP for non-compliance. See: F-5 [FEMA, states]	*In the post-disaster environment, states can make poor policy choices and establish policies that conflict with the NFIP. Some communities choose not to perform substantial damage determinations. In these situations, FEMA must be able to act quickly to warn of and impose sanctions if necessary.* *The DHS, OIG, and GAO have found many of these payments should not have been made. A better process is needed to ferret out means to catch these before payments are made.*
G-12 Provide pre-disaster exercises on rebuilding with resilience to foster productive recovery partnerships. Include focus on resources, requirements and	*The emergency management community effectively uses exercises to build and maintain capability, yet these rarely if ever extend to hazard mitigation and other resilient recovery efforts. By developing*

opportunities. Exercises should be based on strategies identified in local hazard mitigation plans or pre-disaster recovery plans and include federal staff, state agencies, and tribal, territorial and local leaders in vulnerable areas. [MitFLG, FEMA, states, and other federal agencies]	*training and exercise focusing on this aspect of recover, community capabilities can be built and lead to a faster and more sustainable recovery effort overall.*

Subsection H. Structural Projects—Balancing Economics, Environment and Equity

Recommendation	Explanation/rationale
Policy and Planning	
H-1 Use structural flood control projects only as a last flood mitigation resort and never to "protect" undeveloped land or for adding development to "protected" land. See: O-3 [CEQ, USACE, FEMA]	*A long history of federal flood risk reduction experience shows that structural-based protections are often accompanied by increased risk over time due to unfettered and induced building behind or below structures. 'Avoidance' of high risk through greater reliance on nonstructural approaches should be first planning priority, especially for undeveloped and relatively undeveloped areas.*
H-2 Require all federally-supported structural flood control measures for urban and populated areas to take into account future conditions and meet at least 500-year or Probable Maximum Flood (PMF)-level protection standards (to protect federal taxpayer investment and the flood insurance fund), even if BCA is positive only at the 100-year (1 percent annual chance flood) level. See: C-1, C-4, I-3, G-6 [Congress, administration, USACE]	*Given the relatively high probability of flooding in 100-year floodplain – (26 percent chance within a 30-year mortgage), the uncertainties of future conditions and inaccuracies inherent in flood hazard analysis, and the high costs and consequences of major urban flooding, the nation should return to and set a substantially higher performance standard for new or rehabilitated structures. This is a basic recommendation of the 1994 Galloway Report on the Great Midwest Floods*
H-3 NONSTRUCTURAL MEASURES NEED GUIDANCE, SUPPORT AND COORDINATION a) Complete and implement the revised P&R and the follow up on agency Guidelines for Federal Investments in Water Resources and other federal natural resource planning tools. b) Increase and improve coordination among water resources development and flood risk management programs, incentivize and require greater use of non-structural approaches and watershed-based planning, improve balance of economic, social and environmental impacts of water resources projects, and fully account for public safety in designing projects. See: O-1, O-2, I-2, K-12, M-2, M-6, M-18, F-4, F-7 [administration and CEQ, working with FIFM-TF, and federal water resources agencies]	*After more than two decades of expert and agency reports and recommendations, Congress in Section 2031 of the WRDA 2007, directed substantial revisions and modernization of the basic guidelines for formulating and evaluating water resources projects, with particular emphasis on flood damage reduction projects. This process needs to be completed.* *Federal agencies need to collaborate on projects to reach solutions that meet local/regional needs.*
H-4 MITIGATE ADVERSE IMPACTS a) Meet and enforce requirements to prevent or mitigate any adverse impacts (social, economic, environmental) from construction, repair, and rehabilitation of structural projects, prior to or concurrent with the construction of projects. b) Require the full implementation of any/all	*Enforce environmental and wetland mitigation requirements for all structural projects. USACE often fails to meet basic environmental and wetland mitigation statutory requirements and standards that it requires of other agencies and regulated permittees. See statutory requirements of WRDA 2007, Sec. 2036, and GAO and the House Committee on Transportation and Infrastructure oversight findings. Many*

environmental mitigation design components or nonstructural components designed to accommodate natural function during flood events prior to project construction. [USACE, NRCS, FWS, EPA]	*structural projects result in environmental degradation because they fail to accommodate natural functions or their environmental mitigation design components are never completed.*
H-5 Agree upon and adopt common definitions of levees (and other flood-related structures, including floodwalls, seawalls, canals, and dune and beach-based systems); incorporate full consideration of function, risk and vulnerability. [Federal and state water resources agencies, USACE]	*The need exists for more uniform definitions to describe flood control works. WRRDA 2014 directs USACE, FEMA and others to assist in development of such definitions.*
H-6 REPAIR OR REMOVE FLOOD CONTROL STRUCTURES a) Require or Incentivize full analysis and consideration of the removal of a degraded structural project as an option to a substantial repair or upgrade involving federal funding. b) Estimate and document the likely useful life of existing flood control structures nationwide; develop effective strategies to inspect, maintain, repair or remove structures to assure their appropriate life-cycle monitoring and management. [USACE, NRCS, FEMA, ASCE, state dam safety offices, state water regulatory agencies and National Levee Inventory (NLI). See: B-7 USACE, FEMA, MitFLG]	*When a structural project has been seriously or repeatedly damaged or is reaching the end of its useful life, little or no consideration is made to retire the project and develop different or nonstructural alternatives to reduce long-term costs and flood risk. Greater federal cost-share is justified because it removes the taxpayer from future liability and costs.* *Documentation within context of National Inventory of Dams (NID) and NLI would help to develop effective strategies for managing aging flood control structures across the nation. The agencies and states should work with ASCE on this effort.*
H-7 Restore the $45 million threshold for automatic independent review (from the current $200 million) of USACE water resource development projects. [Congress, administration, USACE]	*The independent review process improves project planning, generally does not cause unnecessary delays, and can save substantial taxpayer dollars. Evidence was presented in a House Transportation and Infrastructure Committee hearing March 2010.*
H-8 Disallow reimbursement of local sponsor expenses that are used to build water resources projects before the administration has approved and Congress has authorized the project. [Congress, administration]	*Increasingly, Congress is allowing reimbursements for work done before project planning is completed or the project is approved. This makes it nearly impossible to disapprove even a bad project and undermines the planning process and identification of federal interest.*
H-9 Refine risk-based analysis used in the design and construction of flood risk reduction structures, including additional guidance for projects in high-risk area (urban levees). See: F-12 [administration, MitFLG, FIFM-TF, FEMA, USACE]	*In light of lessons learned in the wake of recent events (Katrina, Sandy, etc.) and new science of climate variance and sea level rise, there is a need to continually update risk-based analysis in designing and building flood risk reduction structures.*

Levees	
H-10 Activate the National Levee Safety Committee (NLSC) of federal agencies, state and local stakeholders, professional associations, and experts as directed in WRRDA 2014 to assist the secretary to develop consistent guidance for levee siting, design, construction, operating, and management standards, to enhance levee performance, set appropriate protection levels, and to build-in resilience and adaptability for existing and future levee-based systems, (e.g., freeboard, spillways, setbacks, etc.). See: G-6, F-11, D-20 [Congress, USACE, FEMA, NCLS]	*Congress has recognized the need for a professional committee to develop consistent guidance for and to encourage "best available" design and management standards for the nation's levees. The lack of such guidance and standards is leading to uneven approaches and management, with the potential for substantial costs and poor decision making into the future.*
H-11 Adopt policies for new or reconstruction of levees that encourage that levees are set back from the water's edge to preserve riparian areas, reduce erosion and scour, reduce flood levels and flooding risks, and to allow natural floodplain ecosystems to better serve their natural functions. See: K-3 [administration, CEQ, USACE, and FIFM-TF]	*Levee setbacks improve public safety and environmental management and help account for and mitigate current and future uncertainties and reduce the risk of failures as well as improve floodplain and natural ecological functions.*
H-12 Provide guidance and training on proper inspection and maintenance of levees for accreditation and recognition for use of federal funding and for recognition by the NFIP; such guidance and training should include responsibility of and potential consequences of liability to levee owners. [NCLS, FEMA, USACE]	*Improved guidance and training for levee inspection and maintenance and recordkeeping is required for FEMA accreditation and to implement a uniform national levee safety program that will improve and strengthen the levee safety and accreditation process.*
H-13 GRANDFATHER SOME NFIP LEVEES a) Because all accredited urban levees would have to move to 500-year or PMF-level of protection, the NFIP should grandfather existing accredited levees that provide between 100- and 500-year protection for a 10-year period, based upon current and estimated future conditions hydrology. b) Make actuarial risk-based insurance available, taking into account the existing flood structures considering the potential damages from the levee overtopping or failing. See: E-2 [FEMA, USACE, states]	*It will be important to grandfather levees with 100- to 500-year protection, but make actuarially-based insurance available. More importantly, develop mechanisms for levee districts/owners to upgrade to 500-year protection in specified time frame.* *FEMA and USACE should develop models and mechanisms to help levee districts to upgrade those structures to 500-year protection, and require monitoring and annual reporting of progress toward such upgrades.*

Dams	
H-14 Remove dams that include, but are not limited to, the following: obsolete, unsafe, those with no identified owner, or those whose adverse environmental impacts outweigh the beneficial uses. See: K-13 [FIFM-TF, USACE, NRCS, FEMA, NOAA,EPA, states]	*Provide technical assistance and incentives for states, locals and dam owners to remove unsafe, costly, unnecessary, and/or environmentally-damaging dams.*
H-15 Conduct a policy study and make recommendations on the appropriate federal role, if any, in addressing aging dams in small and larger watersheds. [Administration, CEQ, FIFM-TF, OMB, USACE, NAS]	*Thousands of dam owners are seeking federal taxpayer assistance to repair private or locally owned dams. A broad-level policy study should be conducted to make recommendations regarding whether federal taxpayer funds should be used at all or to what extent.*
Structural Project Safety Programs—State Led	
H-16 DEVELOP STANDARDS AND INTEGRATE SAFETY PROGRAMS FOR STRUCTURAL PROJECTS a) Develop a national levee safety program to be administered by states that is integrated with state dam safety and floodplain management programs. b) Strengthen state levee and dam safety programs by making federal disaster assistance or other federal funding contingent on an effective state dam safety program. This should be incentivized by establishing an objective, transparent, rating system for state dam safety programs, and incorporating incentives with a reflective sliding-scale formula for federal cost-share. See D-20, O-6, O-15, P-6 [FEMA, MitFLG, USACE, states]	*Only states have the full constitutional authority to require dam owners to perform adequate O&M or remove unsafe structures. Incentives can be provided with grants and disaster relief sliding cost share. It is critical that any levee safety program be integrated with state dam safety and floodplain management programs.* *Studies show substantial variability in quality among state dam safety programs, with more dams moving from low hazard into the high hazard classification because appropriate land use restrictions are not applied to dam "protected" areas. States have the authority and can enact laws and rules to correct this.*
Data Collection and Management	
H-17 Expand the current NLDI and build a detailed nationwide database of levees (public and private), including a range of information such as general condition, design standards, flooding and damage repair histories, and data on the at-risk development (including populations and numbers and values of structures that are potentially at-risk when the levee overtops or fails). See: D-20, F-12, B-6, B-7, A-9 [Secretary of the Army, USACE, FEMA]	*Currently, the NLDI is largely limited to levee projects constructed by USACE or in the PL. 84-99. This excludes tens of thousands of miles of non-federal levees across the nation.* *Make key data available for research, planning and general public information purposes.*
PL 84-99 REHABILATION AND INSPECTION (RIP)	
H-18 UPDATE AND REVISE PL 84-99 RIP a) Conform this program's cost-sharing with other flood damage reduction programs to reduce federal disaster costs, reduce risks, and support	*This more than half-century-old program provides 80-100 percent federal taxpayer cost-shares, an arguably excessive federal level that discourages non-federal owner responsibility. USACE has initiated a much needed revision of*

greater use of comprehensive flood risk management and non-structural approaches. b) Ensure all flood risk reduction alternatives are considered (full range of long-term solutions, which may reduce future taxpayer costs) before blindly and immediately repairing a structural project. c) Halt the current practice of allowing USACE's funding of emergency flood-fight structures under PL 84-99, such as building emergency levees, which is followed post-disaster by FEMA providing federal taxpayer disaster funds to remove the temporary flood-fight structures. d) Require communities with NFIP-recognized structural flood measures to provide a FEMA-approved a multi-hazard mitigation plan and an emergency action plan as conditions of eligibility for the RIP and NFIP flood control project accreditations, respectively. e) Identify repetitive loss levees and flood control works and require consideration of a full suite of flood risk mitigation options in PL 84-99 for the structures (similar to NFIP repetitive loss mitigation programs). See: D-20, F-25, B-6, G-4, G-6, F-8, O-9 [Congress, administration, USACE, FEMA, MitFLG]	*this program.* *The program provides an open ended checkbook that allows USACE to perform immediate emergency rehabilitation of flood-damaged levees and other structural flood control works with little or no consideration of nonstructural alternatives or national social, economic or environmental interests. It should have that same ability to perform immediate implementation of nonstructural alternatives with willing sponsors/property owners.* *Removal of emergency flood fight levees is a local community responsibility since they chose to use a levee as their mitigation option. Re-establish the long-standing policy that local, non-federal interests must be responsible for removal of emergency structures and measures after floods, because current policy is seriously undermining local incentives to invest in permanent mitigation actions.* *Many communities with structural projects have neither multi-hazard mitigation plans nor emergency action plans, despite elevated risks of flooding in the event of project failures. Having and integrating such plans into community operations increase community risk-awareness and motivate flood hazard mitigation actions.* *Such projects should be identified and required to consider a full suite of hazard mitigation options, including relocation or realignments, setbacks, and non-structural approaches to reduce costs and risks. Additionally, consideration should be given to reduce federal subsidies as repetitive costs for projects increase.*
H-19 PROJECT SPONSOR O&M REQUIREMENTS a) Require the local sponsor of structural flood control projects to demonstrate financial and technical capacity to provide the full operation, maintenance, repair, rehabilitation and replacement requirements for all project features, on an ongoing and permanent basis, before project approval and/or recognition and certification of structural and non-structural measures, for purposes of the NFIP, USACE flood damage reduction, and PL 84-99 programs. b) Review and revise procedures in PL 84-99 for monitoring, inspection and evaluation to assure required ongoing OMRRR is performed by non-federal sponsors for structural and non-structural flood risk management projects as a condition of federal assistance or denial.	*Project sponsors too often fail to do their OMRRR. This has resulted in long-term degradation and deterioration of projects, leaving residents and businesses at high risks of flooding, costing federal taxpayers to help with the O&M and increased disaster assistance, and threatening the financial stability of the NFIP Flood insurance claims in Katrina put the NFIP $17 billion in debt, due mostly for insurance claims in levee-protected areas where levees failed.* *Weak requirements, inspection and compliance procedures have allowed substantial deterioration of levees and flood control works, which is increasing costs and risks for communities and increasing taxpayer costs of federal disaster assistance.*

See: K-12 [Administration, FEMA, USACE, Congress]	
Residual Risk area mapping, insurance, management	
H-20 RESIDUAL RISK AWARENESS AND MANAGEMENT a) Map and require mitigation measures for all building/development in failure zones associated with dams, levees, diversions, reservoirs; flood insurance rates should be based on actual risk rates with zones specifically designated on FIRMs. b) Provide additional assistance to local and state governments to help increase public awareness of residual risks associated with water resource-related structures. c) Require that publicly available inundation maps be prepared to depict flooded areas based on failure and/or overtopping of dams and levees under a range of plausible conditions. d) Require local communities to require permanent deed restrictions on all properties located in identified residual risk areas protected by structural flood control measures, as a condition for getting flood insurance or federal support for structural projects. See: D-19, E-1, F-11 [FEMA, USACE, NRCS, TVA, FEMA, BuREC]	*Residual risk lands below dams and behind levees or other flood control structures should be mapped and made subject to mandatory insurance purchase and building regulations to reduce risks and future losses. History of exempting such areas from NFIP requirements has resulted in substantial increases in at-risk building and mounting flood disaster costs over time. Could be designated on FIRMs "AL" for "levee."* *Public is poorly informed about residual risks associated with structural projects. Depiction of flood depths and velocities in substantial floods; using posted signs to identify historic high flood elevations within communities, and publicizing insurance availability could help further public understanding.* *Those concerned with dam security must get past the notion that hiding the risks of dam failure areas outweighs the risks to our own population not knowing they live, work or travel in areas at high risk if the dam fails. Mapping these risks would also help increase awareness and assist governments, private sector, property owners and residents with understanding and decision making.* *Project sponsors should be required to place permanent deed notice on all properties within the project residual risk area, as a basic condition of federal support for flood control projects or availability of federal insurance.*

Subsection I. Economic Methods and Policies Must Support Cost-effective Long-term Solutions

Recommendation	Explanation/rationale
I-1 COST SHARING FOR FLOOD PROJECTS a) Create financial incentives for communities that are taking additional flood risk and floodplain management measures through more favorable cost-sharing for disaster assistance and all federal grants. b) Modify USACE's cost-sharing formula for all nonstructural flood damage reduction to provide a 75/25 federal/non-federal cost-share ratio, similar to FEMA hazard mitigation programs. See: F-19, F-20, B-8, G-2, G-4 [Congress, administration, FEMA, HUD, USACE, DOT, EPA, others]	*Federal grant programs should be structured to reward communities that go beyond the minimum requirements to reduce risks and costs of disasters. This would also serve to incentivize communities to take greater responsibility for flood hazard mitigation. This will reduce taxpayer funding for disasters.* *This will provide a modest financial (cost-share) incentive to encourage communities to use more non-structural approaches for flood damage reduction projects, which will not encourage future increased at-risk development and catastrophic damages from structural project overtopping or failures.*
I-2 FULLY IMPLEMENT P&R GUIDELINES a) Revise and implement federal agency guidelines to reflect the new *Principles and Requirements (P&R) for Federal Investments in Water Resources* and the FFRMS to foster resilience and sustainability. Account for all benefits; provide greater emphasis on nonstructural approaches; and balance economic, social and environmental concerns. b) In developing implementation guidance for the P&R, agencies must require a full accounting of long-term operations, maintenance, repair, rehabilitation and replacement costs be included in benefit-cost analyses for all structural and nonstructural projects, and identify which costs are a federal responsibility or the responsibility of non-federal sponsors or other interests. c) Develop and transition federal planning principles to a National Economic Resilience and Sustainability standard instead of the current National Economic Development (NED) standard to explicitly incorporate the values of multiple ecosystem services, including the non-market public values, provided by the nation's floodplains. See: G-6, K-4, F-4, F-7, B-7, H-3, O-9 [CEQ, Council of Economic Advisers (CEA), federal water resources agencies]	*In WRDA 2007 (Sec. 2031), Congress directed a substantial revision and modernization of the federal planning procedures for water resources development projects. The revision process needs to be completed and implemented. Congress must eliminate annual riders from Energy and Water Development appropriations bills that restrict participation by USACE in finalizing and implementing an updated Principles, Requirements and Guidelines (PR&G).* *A major weakness of past benefit-cost analysis for water resources projects has been failure of project planners to realistically account for their full life-cycle costs over their project lifetimes, resulting in a bias for structural projects that require significant long term O&M and rehabilitation costs, whereas nonstructural designs often have little or no maintenance. This masks the true costs of alternatives.* *The 1983 Principles and Guidelines required selection of water resources projects that maximized the NED, regardless of total costs to taxpayers or the social or environmental impacts.* *Floodplain management, public safety, and long-term environmental quality and sustainability would, in many instances, improve by expanding to a resilience/sustainability standard approach.*

I-3 UPDATE ECONOMIC ANALYSIS METHODS a) Convene a task force of national economic experts to review and make recommendations for possible changes regarding economic planning and evaluation for flood-related projects; including application of discount rates, treatment of residual risks, land valuation, lost opportunity costs, valuation of green infrastructure and ecosystem services and functions, and other considerations regarding structural and non-structural approaches in evaluating flood risk reduction and flood hazard mitigation projects. [OMB, CEA; Congress; working with CEQ, FEMA, USACE, NRCS] b) Incorporate the dollar value of ecosystem services in all federal BCAs and require use in all flood risk and water resource management decisions by all agencies. [CEQ, FIFM-TF, USACE, NRCS, USFWS, NOAA, EPA] c) Fully evaluate all alternatives for reducing flood risk and prioritize use of natural floodplain focused projects over structural measures whenever possible. d) Consider and broaden benefits guidance in benefit-cost analysis for hazard mitigation projects to include all benefits, including non-market societal and environmental benefits. [FEMA] e) Conduct a study to identify differences in methodologies and the potential advantage of establishing a unified, flood-risk management-related benefit-cost methodology for FEMA and USACE programs. [Congress, GAO, NAS/NRC, USACE, FEMA] f) Annually compare FEMA benefit-cost methodology and procedures with emerging BCA best practices and studies of risk reduction, and evaluate and make recommendations to the administrator for BCA improvements. See: K-12, K-13, K-14, F-7, F-12, F-13, F-14, H-2	*a) Current federal rules for evaluating water resources and hazard mitigation projects vary widely among federal agencies and offices and may be distorting the true benefits (and costs) of risk reduction projects. A stark difference in discount rates alone establishes a large, highly questionable economic bias toward structural flood control projects over non-structural acquisitions/relocations or building elevations.* *Current BCA procedures often do not adequately account for foregone benefits and the full life cycle costs of projects.* *b) While this is currently implied for follow-on agency specific guidance in the approved, but not yet implemented, PR&G federal agencies should focus greater attention on developing protocols and values for ecosystem services that are acceptable for use by all federal agencies.* *c) Nonstructural and nature-based mitigation alternatives tend to have lower long-term costs and fewer impacts on social and environment factors.* *d) and e) In June 2013, FEMA took a historic step to allow inclusion of environmental benefits in BCAs for acquisition-demolition project grants for HMA programs. Building on this experience, FEMA should broaden benefits guidance to include all benefits, including non-market societal and environmental benefits in its HMA BCA's.* *f) Such a study should include methods for considering long-term OMRRR costs, green infrastructure alternatives, environmental and social benefits, residual risk and future conditions accounting, and economic discounting. A GAO or NAS study should be a first step. This would build off recent progress and keep the process up to date.*

Subsection J. Building and Rebuilding Sustainable Infrastructure and Public Buildings

Recommendation	Explanation/rationale
Infrastructure & Utilities	
J-1 Develop a coherent and sustainable funding strategy to address the growing need for infrastructure maintenance and renewal and related nonstructural flood risk management activities at the federal, state and local level. See: F-9 [President and Congress jointly]	*This mirrors the recommendation in the ASCE 2014 report on Flood Risk Management.* *The strategy should include innovative methods for shared federal/state/local funding of infrastructure projects and for innovative public-private partnerships.*
J-2 NATIONAL HAZARD RESILIENCE STANDARDS a) Develop national hazard resilience standards for the location, design, construction, and reconstruction of all public infrastructure and buildings that consider: alternative locations, future conditions, green or nature based options, mitigation and NAI. These standards should then become a condition of federal funding. b) Green infrastructure, nature-based approaches and Low Impact Development (LID) must be used in standards for constructing and reconstructing infrastructure. See: O-1, O-2, K-4, G-6, L-1, L-7, D-1, D-20, D-19, F-1, F-4, F-7, F-11 [Congress, administration, MitFLG, states]	*This will protect federal investments in infrastructure and reduce future public assistance after disasters. Although flood is the primary interest here, this must be done as multi-hazard. This ties closely to development of a FFRMs in O-1.* *GI and LID can be defined as the natural and man-made landscapes and features that can be used to manage runoff. Examples of natural green infrastructure include forests, meadows and floodplains. Examples of man-made green infrastructure include green roofs, rain gardens and rainwater cisterns. NAI incorporates LID and GI.*
J-3 MITIGATING PUBLIC FACILITIES/INFRASTRUCTURE a) Require utility companies (eligible for PA) to analyze the full range of mitigation options and account for current and future flood risk in planning, design, construction and reconstruction of facilities. b) Future federal assistance should be prohibited unless the requirements in J-2 a) and b) have been adequately incorporated. See: O-1, G-6, K-4, J-2, L-1 [MitFLG, FEMA, states]	*This will reduce the damage to utilities and hold them accountable for considering flood risk in decision making when using taxpayer funds to rebuild after a disaster.* *Federal taxpayer investment must be protected, or funding to fix the same problem is required again and again.*
J-4 HIGHWAY DAMAGES AND REPAIR a) Improve sharing post disaster highway data and best practices to improve resilient reconstruction of non-federal/state highways. b) Develop guidelines to assist local highway departments to help them in reconstruction following flooding. [FEMA, DOT, states]	*Local department of public works (DPWs) often lack staff and expertise to know the best management practices for road rebuilding.* *DOT and FEMA, working with state DOTs can develop guidelines and perform local training.* *See added recommendations in the ASFPM report for American Lifelines Alliance regarding this topic.*

Section 3 (K & L): Natural and Beneficial Functions

Over the past five decades the nation has become more aware of the importance of the natural functions of floodplains, with a number of programs in a variety of federal agencies to address this issue. A large portion of our natural resources have been destroyed or lost over the last century, so we are now faced with the need to preserve whenever possible, restore (e.g. Everglades) some of those resources in order to retain the ecosystems that are critical to our current and future way of life in this nation.

There are many existing federal and state programs that can be used to leverage actions to protect or enhance natural and beneficial floodplain functions. Many of them are either unfunded or underfunded, and some can be tweaked or integrated with others to be more effective. Too often these programs are seen as impediments to development for short-term economic benefits, but in reality, they save taxpayers money over the long term. Effective local leadership is needed because they make these development decisions every day.

Managing flood risk on a watershed basis has many advantages, but is complicated because watersheds do not match political boundaries. Some river basin authorities have had some success in parts of the nation, but that is not a model that can be readily duplicated for governance. Some of the more successful watershed programs have been those addressing stormwater using techniques addressing watershed wide impacts, such as Total Maximum Daily Loads (TMDLs). One of the challenges of stormwater programs for addressing flood risk is that stormwater focuses on water quality, whereas floodplain management programs focus on water quantity. These different programs tend to be stove-piped at the federal level, which stove pipes are then replicated at the state level, leaving integration up to those running these different programs at the local or regional level.

A number of larger regional water management authorities who have stormwater programs are doing a good job of integrating their program with their flood risk management program, but much work is needed at all levels to make this integration effective nationally. Watershed programs can/could address water quality, create buffers, reduce flood risk, provide habitat, preserve flood storage and conveyance and reduce flooding for all local communities in the watershed if there were incentives and an integrated approach from the federal level on down. New approaches in LID and GI would be most useful here.

Subsection K. Natural & Beneficial Floodplain Functions
Reduce Flood Losses

Recommendation	Explanation/Rationale
Leverage existing programs for NBF	
K-1 Implement the 2014 Farm Bill to utilize the benefits of conservation easements to protect high flood risk, high resource value and erodible lands in light in rising crop prices and food demand. Review the impact of existing programs and suggest improvements to promote sustainable uses. See: K-7, Q-5, F-12 [USDA, Farm Service Agency (FSA), NRCS, EPA, FEMA, NOAA].	*Should include 1) review the impact of existing programs and then 2) suggest how to implement improvements.* *High crop prices and subsidized crop insurance have led to farming marginal land and withdrawal of vulnerable lands from conservation programs. This leads to increased runoff from the newly farmed land, more drainage of land, reduced water quality, and increased downstream flooding due to the reduction in infiltration and storage on the land and within the soil.*
K-2 CONSERVATION EASEMENTS a) Promote and expand the use of existing easement programs on agricultural and undeveloped lands to protect areas with high flood risk, highly erodible soils, loss of floodplain connectivity, and high resource value for providing ecosystem functions. This could include conservation easements to maintain farmland with practices that allow creation of flood storage areas during large events. b) Convert continuous Conservation Reserve Program (CRP) to a permanent easement program for riparian buffers nationwide, or look to establish riparian habitat banks for projects and areas where riparian buffers or easements are not possible. See: Q-5, Q-6 [NRCS, states]	*Considerations for easements would include what type of farm management practices would be acceptable, how to compensate crop losses given the public benefit provided through farm field flood storage. Build off existing conservation programs because new money, programs or authorization is unlikely.* *Urban areas that are protected by storage on farm land should compensate farmers for allowing flood storage on their land.* *Term limited easements do not serve the longer range public interest.*
K-3 BUFFERS AND RIPARIAN ZONES a) Establish a National Riparian Zone Policy. As part of this policy encourage continuous buffer zones along all waterways and coasts to preserve the ecosystem services and reduce flood damages. b) Encourage continuous buffer zones along all waterways and coasts. c) States and local communities should require building setbacks and agricultural practices that provide natural buffers on all streams and coasts to protect water quality, flood storage, ecosystem services and development outside of the buffers. d) Identify remaining natural floodplain or riparian corridors in streams order four and higher. See: L-3, L-5, H-14, H-11, F-12 [MitFLG, EPA, NRCS, FEMA, NOAA, HUD, CEQ]	*This can incentivize state and local buffers through extra points in federal grant applications for those communities who use it because it reduces flood losses and benefits water quality and ecosystem functions and reduces future disaster costs. There is CRS credit for these buffers.* *Buffers are one of the most effective means to protect both water quality and habitat and to reduce flood damages and flood insurance costs.* *Some states have buffers in shoreland management programs which avoids grading right to the apex of the bank and the subsequent failure of the previously stable bank.*

K-4 All federal policy documents should provide increased emphasis on social and environmental values, sustainability and resilience and not just economic development. They should emphasize GI, LID and NAI principles. See: I-2, I-3, L-1, L-2, L-7, J-2, J-3 [CEQ, all fed effected agencies]	*More emphasis on resilience and sustainability is needed. The other means of supporting this would be finalizing new, clear guidance under NEPA. CEQ issued new draft guidance on these points and especially future conditions analysis for climate change-related environmental review under NEPA. Agencies now need to develop their guidance.*
K-5 MIT-FLG should review implementation of Section 404 of the Clean Water Act to determine how it can encourage or compliment flood loss reduction and mitigation efforts by better protecting riparian areas, wetlands and waters of the US (E.g. consider that a requirement to maintain buffers around existing waterway/wetlands be established). [MitFLG, USACE, FEMA, EPA]	*The impact of any permit application on flood levels, velocity and erosion and on other properties should always be analyzed and mitigated before the permit is allowed to proceed. Too often a plan to mitigate ecosystem adverse impacts from a development results in a permit approval, but the mitigation action is never performed.*
New or expanded approaches	
K-6 Establish and fund a permanent environmental restoration program within USACE to restore habitat and watersheds throughout the nation (not tied to Section 1135 for USACE projects). Projects should have a total construction cost of not more than $50 million and an annual budget of not less than $1 billion. See: K-7 [Congress, USACE, NOAA, USFWS, NRCS, EPA]	*USACE is the agency that does projects, so they could be the ones doing the work (e.g. LA River).* *As an alternative, or in addition, establish grant programs run out of NOAA, NRCS and other agencies for restoration work.*
K-7 FUND CONSERVATION PROGRAMS a) Expand NOAA's CELCP program to include critical non-coastal riparian habitat and recognize the importance of maintaining coastal and riverine riparian habitat and providing buffers to adapt to climate change. b) Fund the CELCP program to a minimum of $50 million/year. c) Reauthorize the CZMA (long-term). d) Fully fund the Land and Water Conservation Fund (LWCF) to the authorized $900 million; one of the most long standing and effective programs for acquisition of recreational and critical habitat and highly erosive land. See: M-3 [administration, Congress, NOAA]	*CELCP is the rare program at the federal level dedicated to acquiring and preserving land. There does appear to be statutory flexibility in existing law for this.* *This is consistent with recent emphasis on adaptation to changing weather, sea level rise and building resilient communities.* *Reauthorization of CZMA has been virtually dead for more than a decade (other than year to year extensions).* *LWCF is a 50-year-old program funded by offshore oil revenues to protect valuable land for recreation and preservation from development. Congress appropriates less than half of available funding, which has ranged from $369 million to current funding in the $40 million range, but must be fully funded.*
K-8 FEMA, communities and states should prohibit fill in all SFHAs to protect the natural and beneficial functions of floodplains, including flood storage, and identify and implement incentives beyond CRS to communities that adopt this higher measure. See: F-17 [FEMA, communities, states]	*Fill may benefit the person doing the filling, but can increase flood risk on others. This recommendation is a basic NAI concept and it is credited in CRS. Some communities allow minor filling if there is offsetting compensatory storage at 1 ½ to 3:1. See Charlotte-Mecklenburg studies that provide a model of how much impact such fill has on flood levels.*

K-9 Where listed endangered species or their habitat is present an environmental assessment should be required for all floodplain development permits unless local standards meet the requirements of the relevant biological opinion. [FEMA, NMFS, states, communities]	*The application of ESA to the NFIP is being refined by the courts. FEMA and NMFS are collaborating on implementation of appropriate measures where endangered species exist.*
K-10 FEMA should work with its state and local partners to create regulations for erosion zones to maintain high quality habitat and to protect development from erosion losses, including channel migration zones adjacent to rivers, streams or along coastlines. See: A-8, A-9, D-18 [FEMA, states, NGOs]	*This mapping has been done by some state or local jurisdictions to a standard that should be accepted by FEMA as the official map. See Vermont and Washington models for mapping best practices and standards.* *Not only are these areas risky for development, but they frequently provide some of the most valuable habitat within the watershed.*
K-11 Increase the CRS minimum points required to be earned by communities in elements that credit natural floodplain functions for CRS class 4 through class 1. [FEMA]	*More emphasis on NBF reduces hazards, promotes many other beneficial functions and services, and the current requirements are too low to encourage effective community measures.*
Evaluation of Programs and Studies	
K-12 Require that funding and regulatory decisions to armor shorelines, stream banks or lakeshores, include an evaluation and assignment of long-term costs to mitigate the adverse impacts of armoring, including erosion, scour and habitat as well as the long-term cost of O&M. See: M-2, M-6, M-18, I-3, H-3, H-19, F-16 [Corps, CEQ, states]	*There is great importance in maintaining and enhancing natural floodplain functions as a critical part of overall sustainable flood risk reduction. The preference should be to not armor the site except in extremely rare instances.* *This may require modifications to the nationwide 404 permit for private bulkheads and sea walls.*
K-13 Initiate a national study on environmental degradation resulting from past water resources development and the impact of that degradation on the economy. See I-3, F-16 [NSF, MitFLG, NAS]	*The intent is to analyze the <u>loss</u> of water resources and riverine/coastal ecosystems that has occurred over the last century, and what impact that has on ecosystems, added flooding and quality of life to economic impact.*
K-14 Collaborate to identify ecosystem functions in conjunction with flood mapping and to integrate/create/enhance those functions in managing flood risk. See: I-3, M-11 [MitFLG, FEMA, EPA, FWS, NWI, USGS]	*For example, groundwater recharge areas may not show up as a mapped "resource," but certainly it provides a function that needs to be mapped and protected.* *See Vermont model for mapping.* *Some of this is specifically required by BW-12 TMAC and NFIP mapping, and the case should be made for a robust collaboration and good justification as to why this should be a priority.*

Subsection L. Effective Stormwater & Watershed Management

Recommendation	Explanation/rationale
Watershed Management	
L-1 PROMOTE WATERSHED APPROACHES a) Recommend or require holistic, LID, GI and NAI stormwater approaches at state and local levels for the management of runoff to reduce flood damage throughout watersheds and for the protection of water quality, natural systems and groundwater recharge." Set a standard by watershed and create a baseline no watershed could fall below. b) Emphasize and foster the integration of floodplain, habitat and water quality programs within all watershed management approaches at state and local levels. c) Develop mechanisms to quantify benefits of flood risk reduction and water quality in all FEMA, HMGP and EPA Section 319 and Smart Growth and Resilience demonstration projects. See: J-2, J-3, K-4, G-6, F-1, F-12 [states, FEMA, EPA, USACE, MitFLG]	*GI and LID can be defined as the natural and man-made landscapes and features that can be used to manage runoff. Examples of natural green infrastructure include forests, meadows and floodplains. Examples of man-made green infrastructure include green roofs, rain gardens and rainwater cisterns. NAI incorporates LID and GI.* *The goal of watershed management should be the preservation of natural processes and existing habitat while protecting/improving water quality, water for beneficial uses, groundwater recharge and ensuring any potential increase in future flood hazards is mitigated.* *This may require modification of current watershed planning guidelines from EPA to determine current and future flood hazard benefits and impacts.* *The most effective local programs tend to be those that address multiple issues, not single issue or single agency programs.*
L-2 States and EPA should require watershed (stormwater) management that prevents an increase in flood flows by new development or redevelopment with attention to control of not only peak flows, but also the volume of runoff and the timing of runoff for a range of flows from a channel forming event to moderate (100-year) flood event. Again, these standards could be applied by watershed, with minimum baseline for any watershed. See: K-4, D-11, O-12 [states, EPA]	*Without the control of increased runoff (peak and volume) of runoff from new development, the cost of development is transferred from the developer to property downstream. Several states mandate matching the peak flow for one or more design events for the pre- and post-development condition. It is better to also control the volume of total runoff for a range of events and use the natural condition for the pre-developed state.*
L-3 Wetlands (including appropriate buffers) and other flood storage areas inside and outside of the 1 percent chance floodplain should be preserved to maintain or reduce upstream and downstream increases in flood frequency and heights. States and communities should not allow wetlands and storage areas to be filled without appropriate mitigation, including complete replacement of their storage function. See: K-3 [USACE, FEMA, MitFLG, states]	*This type of activity is awarded CRS points in watershed management plans, recognizing the interdependence of the jurisdictions and protecting the assets of the upstream community, while avoiding increases in flooding of the downstream community/properties. This will also define who might be responsible for the potential liability for changes that might damage downstream investments or assets.*
L-4 STORMWATER—FLOOD RISK INTEGRATION a) EPA, as part of construction and Municipal Separate Storm Sewer System (MS4) permits should consider	*Standards vary from 2-5 year for EPA and 1 percent chance or 100-year for FEMA. Because these standards are based on the probability of an event, they reflect*

requiring the control of the peak and volume of the 1 percent annual chance event to prevent severe erosion of stream channels, pollution, and damage to adjoining structures during flood events that creates more pollution. b) EPA, USACE and FEMA should collaborate to address the disconnect between water quality and quantity that results in exacerbating current problems for one while mitigating the other. See: D-11, Q-11, O-4, F-12 [EPA, FEMA, USACE]	*regional conditions and can still be uniform nationwide. For example, a two-year standard for the water quality event and 100 year for flooding may be acceptable if designs to address the tiered approach are utilized.* *This is needed to ensure that agency programs complement each other and ensure states and communities that implement and utilize these programs do not get conflicting, nonintegrated rules/guidance.*
L-5 Resource buffers (protective, riparian, natural areas) should be considered in all new development to protect water quality, flood storage, ecosystem services and development outside of the buffers. See: K-3 [states, MitFLG]	*Buffers are one of the most effective means to protect water quality and habitat.*
L-6 EPA should consider extending the standards of the CWA to all development greater than a half-acre instead of the current one acre with the appropriate approaches to address agricultural practices. [EPA]	*Small feeder streams are critical to downstream water quality and natural ecosystem functions.*
NFIP Support of Effective Stormwater Programs	
L-7 As a prerequisite for a Class 4 rating, require all CRS communities to require all new development and redevelopment to use NAI, LID and GI techniques to the maximum extent possible for each site to mitigate their adverse impacts. See: K-4, J-2, G-6 [FEMA, NFIP partners]	*This would put more emphasis on using NAI, LID and GI "to the maximum extent possible" by the most highly rated of the CRS communities. This also means developers would use the techniques that are appropriate for their community. This mitigates floods by reducing impervious surfaces and maintaining infiltration to avoid increased flows due to development.*
L-8 Encourage/incentivize (CRS and other) runoff reduction through the use of infiltration, low impact development and green infrastructure techniques to reduce and manage flood flows and runoff to help in protecting water quantity and water quality. [FEMA, EPA, MitFLG]	*This would give some focus on infiltration and permeable surfaces rather than a focus on moving water away from the land via conveyance.* *Credits could also come in form of advantageous sliding cost-shares for federal grants, disaster assistance or other incentives.*

Section 4 (M & N): Flood Risk Management in Especially Hazardous Areas

Some of the highest risk flood hazard areas in the nation are our coastal regions. Not only are they subject to increased flood probability due to increased intensity of storms, but also to rising sea levels that are predicted to rise from 2-6 feet over the next century, with different rise in different sections of the coast. Flood risk is greatly increased not just because the probability of flooding is increasing, but because the consequences are increasing rapidly due to the added population moving to the coast and building larger and more expensive buildings. Furthermore, public infrastructure is needed to service this increased population, and most taxpayer disaster dollars go to rebuilding that public infrastructure after a disaster.

At the same time, a significant percent of our Gross Domestic Product is generated by the natural resources in coastal areas. So the conflict is high between the pressure to develop and retaining these valuable natural resource functions. Nature's natural defenses, such as barrier islands, will act as buffers to protect the mainland during coastal storms, and then rebuild themselves during periods between storms. However, many of those barrier islands have been fully developed with houses and other buildings, so communities attempt to armor those islands as their means to "protect" the development, rather than gradually retreat from these increasingly risky areas.

Coastal wetlands and estuarine areas are critical to the nation's fishery and are under constant threat of being filled or altered and losing their natural functions. This is especially evident in the everglades and the Gulf Coast. It will now take billions of dollars to recreate what has been lost, and it will likely never have the full value of what was lost. But the impacts are so great, there are benefits to much of the restoration.

The key to sustainable development in coastal areas is "where and how" we develop. Location is the most important, as can be seen when developing or paying to redevelop in areas that are already below sea level, or will be further threatened by rising sea levels, increased storms and too often lands that are subsiding from water withdrawal, weight of development, and cutoff of sediment that naturally rebuilds those wetlands.

Arid regions are often thought of as dry and not subject to flooding. But in many ways, just the opposite is true. Sometimes wildfires destroy existing vegetation, resulting in rapid runoff, flash flooding with little warning or sediment flow. Rapid runoff erodes stream banks and carries the debris from the wildfire down the mountain and blocks flow at bridges or other narrow points. On alluvial fans (areas where sediment is deposited as the mountain stream hits the flatter land below the mountain) so much velocity carries so much sediment that the stream moves to different locations throughout the fan, making it difficult to know where to allow or disallow development so that it is safe now and in the future. Mapping and managing arid regions will require additional research and development of best management practices based on what really works.

Subsection M. Sustainable Flood Risk Management of Coastal Areas

Recommendations	Explanation/rationale
Funding	
M-1 Federal funding agencies should provide preferential support (grants and cost share) and other incentives to states and localities that adopt land use management policies that incorporate strategic retreat from shorelines subject to erosion and sea level rise. See: F-4 [FEMA, NOAA, USACE, HUD]	*Funding conditions should require all coastal states to plan for sea level rise and develop and implement a long-term plan to prevent future development and relocate existing development from high-risk low-lying areas vulnerable to sea level rise and other coastal flood and storm hazards. Preserve these areas for natural floodplain functions, natural resources and public recreation.*
M-2 Federal and state funding and regulatory decisions to armor shorelines should include an evaluation and assignment of long-term costs to mitigate potential adverse impacts of armoring, including erosion and scour, and loss or degradation of environmental services. See: K-12, M-6, M-18, H-3 [USACE, NOAA, State Coastal Zone Management program (CZM)]	*Agency decisions should consider potential adverse impacts of armoring and identify actions and funding sources that may be required in the future to mitigate these adverse impacts.*
M-3 Federal funding agencies should provide more funds for acquisition of property and/or easements on barrier islands, and leverage such funds after a disaster. Consider how funding may be used to offset short-term financial impacts of acquisitions on developed communities. See: K-7, F-4, F-9 [FEMA, NOAA, USACE]	*More funding should be directed to acquisition of vulnerable barrier island properties to provide long-term mitigation and reduce repetitive loss and public disaster recovery expenditures.*
M-4 Federal funding agencies should increase funding for programs designed to improve public awareness of natural resource coastal functions, coastal risk, storm preparedness, and evacuation. See: B- 3 [FEMA, NOAA, USACE]	*Public awareness of natural hazards and the benefits of natural systems in mitigating these hazards is critical to facilitating better regulatory and funding decisions at all levels.*
Policy and Planning	
M-5 MANDATE COASTAL PLANNING HORIZONS Federal agencies should establish a national policy to consider expanded coastal management planning horizons (e.g., 50, 100 years) that account for: a) A realistic estimated lifetime of a given action/investment; b) The long-term, cumulative impacts and costs of erosion, sea level rise, subsidence, and changes in storm intensities and frequencies over that timeframe; and c) Explicit consideration of uncertainty in hazard	*Planning and associated policy decisions need to account for changing conditions in the future in order to reflect the most cost-beneficial actions and investments over the long term. Conservative assumptions should be applied to address uncertainties and promote more sustainable solutions.*

information and other factors that can lead to premature loss of the resource or investment. See: A-1012, A-19, C-4 [NOAA, FEMA, USACE, HUD]	
M-6 Federal and state mitigation projects should avoid the use of hard structures to address eroding shorelines and riverbanks unless there are no adverse impacts to other properties, ecosystems or cultural aspects can be demonstrated. In order to support resilience over the long term, federal funding programs should give preference to strategic retreat or natural/nature-based mitigation approaches, or combinations thereof. See: M-18, H-3, K-12 [FEMA, USACE, NOAA, state NFIP and CZM programs]	*Structural solutions intended to protect people and property along vulnerable coastal and riverine shorelines should demonstrate that adverse impacts will be avoided or mitigated.* *In order to reduce potential adverse impacts that often result from structural solutions, nonstructural and nature-based solutions should receive funding priority.*
M-7 Federal and state agencies should plan, design, build and retrofit highways and other transportation networks to meet current and future community needs to effectively evacuate at risk population in events up to and including the 0.2 percent-annual-chance event. [U.S. Federal Housing Administration (FHA), DOT, FEMA, HUD]	*Given the critical importance of storm evacuation, mitigation of future flood and storm impacts to a higher standard should be a primary consideration of all roadway projects in high risk coastal areas. A valid option is to avoid/retreat development where evacuation is not possible or cost effective.*
M-8 Federal agencies should require comprehensive planning for coastal acquisitions to ensure that acquired lands are dedicated to resource restoration and enhancement to increase the level of natural protection, and to promote public access to public lands. See: D-5, M-11 [NOAA, FEMA, USACE]	*Restoration of preserved lands will provide enhanced ecosystem services and mitigation benefits.* *Public use and enjoyment of these preserved lands will provide public support and advance efforts to acquire and restore property for public benefit.*
M-9 Flood and storm warning and evacuation plans should be tested annually and involve local governments, businesses and the general public to improve public awareness. [FEMA, State Offices of Emergency Management (OEMs)]	*Regular testing of storm warning and evacuation plans will ensure greater levels of life/safety protection and compliance with the plans when events occur.*
M-10 NERRS provisions should be modified to allow acquisition of uplands to facilitate landward migration of wetlands, restoration of protective dunes and natural systems, and preservation of floodplains. [NOAA]	*Expanding the acquisition program will enhance the protective capacity of natural systems and help mitigate adverse impacts of floods and storms.*
M-11 Through a periodic review of programmatic activities, federal agencies should enhance their interagency coordination, and coordination with coastal states, to better integrate coastal zone, floodplain and emergency management programs and policies to	*Conflicting goals and priorities between agencies often impede progress on the implementation of cost-effective mitigation activities.* *Reconciliation of program priorities will enhance efficiencies*

identify actions that align programs and goals. See: D-5, K-14 [NOAA, FEMA, USACE, EPA]	*and promote more effective long-term solutions.*
Mapping	
M-12 Coastal flood maps should be improved by integrating bathymetric and topographic maps to show all flood related hazards, including storm surge, wave run-up, overland waves, tsunamis (where applicable), erosion areas and increased water surface elevations from future conditions. See: A-8, A-10, A-19 [FEMA]	*Inclusion of additional hazard data that can increase flood damages on coastal flood maps will promote greater awareness of the range of hazards and result in better decision-making at the state and local level.*
M-13 Erosion hazards should be mapped on FIRMs and communities should be required to manage coastal erosion hazards just like flooding, in order to qualify for federal flood insurance. See: A-9, D-21 [Congress, FEMA]	*Erosion presents a significant hazard that often results in damage to coastal buildings. Requiring erosion hazard areas to be mapped and communities to manage development in erosion hazard areas will help mitigate storm damages and associated public recovery costs and increase risk awareness. In states that have coastal erosion zone programs, state coastal erosion standards, such as setback lines, should be mapped on the FIRMs.*
M-14 LiMWAs should be delineated on all coastal flood maps and enhanced design standards should be adopted for construction of new buildings in these areas. See: A-13, A-14, E-1 [FEMA]	*Buildings located within areas subject to LiMWAs are vulnerable to scour and erosion from moderate wave action, which results in foundation damage and failure. Mapping this hazard will increase awareness of damage potential and adoption of enhanced design standards will help mitigate structural damages.*
Regulations	
M-15 FREEBOARD IN COASTAL FLOOD HAZARD AREAS Communities exposed to coastal flood hazards should adopt floodplain ordinances requiring a construction freeboard standard of 3 feet, which accounts for: a) The projected future increases in sea level that are based on the best-available historical local relative sea level rise projection, b) Full build-out of the watershed in estuaries, and c) Other future conditions that will exacerbate flood hazards. See: D-8, F-1 [FEMA, NOAA, states, local municipalities]	*A 3-foot freeboard requirement for building construction will mitigate future damages to structures from increasing flood and storm events by accounting for higher flood heights over time. The relatively small additional construction cost will be offset by reduced damages, lower flood insurance costs and associated recovery costs. Many of these future projections are published by the NOAA.*
M-16 A coastal A Zone definition should be developed and adopted in the CFR. See: D-1, A-14 [FEMA, states]	*Coastal A zones present unique hazards that should be defined and specifically regulated under NFIP to mitigate hazards in these areas.*
M-17 Enforcing the protection of dunes and mangroves as required in NFIP regulations should be enhanced.	*Dunes and mangroves provide significant protection to people and property in coastal areas. Strict enforcement of NFIP*

[FEMA, states]	*provisions related to these natural systems is critical in maintaining and enhancing their protective capacity.*
M-18 COASTAL AND ESTUARINE PERMITTING a) Regulatory permitting regimes should reflect current science and engineering for estuarine systems that: coordinate federal, state, and local permitting requirements; consider the broader impacts of shoreline management decisions beyond the single parcel being permitted; provide appropriate incentives for NAI shoreline management; and yield more consistent and predictable outcomes. b) In any permitting scheme, hardened structures on shorelines should be a last resort, only available if softer methods are shown to be ineffective or impractical. c) In cases where shoreline armoring is deemed appropriate, sloped structures such as rip-rap revetments should be prioritized over vertical seawalls/bulkheads in order to minimize potential adverse impacts resulting from scouring and wave reflection. See: M-2, M-6, H-3, K-12 [USASCE, FEMA, EPA]	*Federal and state permitting of hardened shoreline stabilization structures generally and USACE nationwide permits (and some states regional general permits) issued do not adequately consider the state of current science about the cumulative, long-term negative impacts of these structures on aquatic systems and water quality and the relative benefits of softer structures. These existing regulatory programs also often ignore the potential adverse impacts of armoring on adjacent shorelines and nearshore areas.* *Except where states have responded to excessive hardening by advocating changes in permitting systems, the federal regulatory regime has perpetuated the status quo bias in favor of hardening shorelines and has impeded needed change in the overall regulatory system.* *Shoreline armoring with sloped rip-rap sloped structures will mitigate or reduce adverse impacts associated with vertical shoreline structures by absorbing and dissipating wave energy and scour.*
M-19 The Coastal Barrier Resource System (CBRS) map inventory should be modernized and the monitoring, enforcement and penalties for non-compliance of provisions of the Coastal Barrier Resources Act should be strengthened. [USFWS]	*CBRS maps need to be maintained to reflect the most current areas to ensure protection as mandated in the Act. Enhanced enforcement and compliance is critical to meeting the goal of the Act to limit development in high hazard areas and reduce taxpayer costs associated with noncompliant and inappropriate development decisions.*
M-20 The removal of protected natural, wilderness or federally-owned areas from CBRS should be prohibited. [Congress]	*Existing areas within the CBRS should be maintained in order to protect the beneficial functions of natural systems and to limit taxpayer expenditures associated with development in vulnerable coastal areas.*
Beach Nourishment	
M-21 Federal agencies that plan, fund and/or conduct beach nourishment operations should demonstrate that the federal interest in beach nourishment exceeds the federal interest in nonstructural, nature based and other, more permanent mitigation options that are more sustainable and don't require ongoing expenditures. See: F-4 [USACE, FEMA]	*Nonstructural storm hazard mitigation projects are ignored in favor of beach nourishment, which is an expensive, temporary solution. Federal funding for beach nourishment should be provided only in cases where other mitigation options have been shown to provide lesser benefits over the long term.* *This evaluation should include an objective benefit-cost analysis, with adequate public input, to select and fund mitigation projects that will have the greatest benefit at the lowest federal cost over the long term compared to other mitigation options.*
M-22 Adopt federal standards for agencies that plan, fund and/or conduct beach nourishment operations to	*Federal funding for nourishment should only be provided when there is a clearly defined federal interest. Defining the*

define the scope of specific benefits that must be considered in demonstrating when a particular project is in the federal interest. [USACE, FEMA, OMB, CEQ]	*scope of what constitutes a "federal interest" is critical to ensuring appropriate spending of taxpayer dollars on nourishment, which often has local benefits, but seldom has clear federal taxpayer benefits.*
M-23 BCA for federally-funded nourishment projects should identify and evaluate full costs, including periodic re-nourishment, increased costs for locating and acquiring suitable material, long-term project maintenance and required protection of induced development and redevelopment. Public funding for these projects should be limited to projects that clearly demonstrate that benefits will exceed costs. [USACE, FEMA, OMB]	*Failure to accurately define and consider full costs of beach nourishment as a long-term mitigation option results in skewed federal funding and may preclude funding for more cost-effective solutions. This results in ongoing, repeated federal expenditures required for periodic, repetitive nourishment, which often exceed the project benefits.*
M-24 COST SHARING FOR BEACH NOURISHMENT a) Cost-sharing agreements for federal beach nourishment projects should be revised to 35 percent federal, 65 percent non-federal, in order to shift more of the cost to the non-federal sponsors who receive a majority of the project benefits. b) No beach nourishment project, including after disasters, should ever be 100 percent federal funding. [Congress, administration]	*As a matter of federal taxpayer equity, states and local municipalities that receive the greatest benefits of nourishment projects should contribute the greater share of costs. In some cases, the local jurisdiction that receives the greatest benefit contributes only 8 percent of the total project cost. Increasing the non-federal share of project costs will result in better long-term mitigation decisions at the state and local level.*
M-25 Federal beach nourishment projects should be monitored and evaluated periodically to determine: if the project has actually performed as planned and justified based on initial costs; if the project should be abandoned or the design should be amended to reflect changing conditions; or to increase efficiencies, reduce costs and provide greater benefits. [Congress, USACE, FEMA]	*A 50-year authorization for nourishment projects does not account for changing conditions, which might suggest an alternative design, or in some cases, might cause the authorized project to fail a BCA. Periodic evaluations during the project life will provide an opportunity to implement project modifications/reduce costs.*
M-26 Planning, BCA, design and construction of federal nourishment and re-nourishment projects, including previously authorized projects, should account for sea level rise over a realistic project life. See I-2, I-3 [Congress, USACE, FEMA, OMB, CEQ]	*Many federal nourishment projects have not been planned and designed in consideration of sea level rise over a realistic project life. Failure to consider the effects of sea level rise may impact project performance and may skew the BCA and project selection.*
M-27 Meaningful public access to and use of beaches nourished with federal dollars should be included as a condition of funding. [USACE, FEMA, administration]	*Since taxpayers fund a large share of nourishment projects, the public must have meaningful access, parking and facilities to these resources.*
M-28 ANALYZE PAST BEACH NOURISHMENT PROJECTS Conduct a review and audit of federally-authorized (and possibly others) beach nourishment projects along US	*A credible and substantial study is needed to ensure feasibility study projections are even close to actual. This is especially needed to better understand implications for situations with*

East and Gulf Coasts to: a) Compare initial construction and future-projected re-nourishment costs and projected frequencies of re-nourishment with subsequent actual experience. b) The degree to which local sponsors have met their project-related obligations. c) Determine whether feasibility study-estimated project cost projections adequately take into account changes in sea level and increased storm intensity, and whether existing sand sources are adequate to maintain projects that are authorized for construction (for project "life" and in perpetuity). d) Inform/support recommendations. See: M-21, M-23, M-25, and M-26. [GAO NAS, National Science Foundation (NSF), MitFLG]	*increasing relative sea level rise and erosion. Such a study could shed essential light considering what may be the most effective coastal flood risk management strategies into the 21st Century.* *See the GAO study of beach nourishment costs, responsibilities and sustainability.*
Flood Insurance in Coastal Areas	
M-29 Evaluate expanding the mandatory flood insurance purchase requirement to require flood insurance for all buildings in coastal storm surge zones located outside of the 1 percent annual chance SFHA. The areas to be included in the mandatory purchase zone should be at least the greater of the 500-year flood zone or the 100 year still water elevation plus three feet. [Congress, FEMA, OMB]	*Buildings located in storm surge zones outside of the 1 percent annual chance SFHA are vulnerable to significant damages during storm events, resulting in expenditure of taxpayer recovery funds. Requiring flood insurance for these structures would result in more resilient construction and would reduce taxpayer liability.*

Subsection N. Arid Regions Flooding: Integrated Management Needed

Recommendations	Explanation/rationale
Mapping and Regulation in Arid Regions	
N-1 STANDARDS RELATED TO ARID REGION ISSUES a) The NFIP should revise definitions, regulations, and elevation requirements in arid regions for existing SFHA zones: approximate Zone A in shallow sheet flooding less than 1-foot deep, Zone AH in true ponding areas, and Zone AO where depth exceeds 3 feet. The latter category should be rezoned to Zone AE. b) The NFIP should also clarify the elevation and freeboard requirements above natural grade in approximate Zone A, with no BFE (Refer to 44CFR Parts 59.1, 60.3(b) and (c)). See: D-1 [FEMA, in conjunction with state and local partners]	*It is essential the mapping and regulation of floodplains in arid regions be closely linked. Regulatory requirements for various zones without a BFE should be clearly stated for use in arid regions.* *While these zones and issues apply to areas other than arid region areas, they are especially important in situations often encountered in arid regions.*
N-2 The NFIP and states should disallow, through clear and strongly worded regulations, development in areas subject to flow path uncertainty, erosion and debris. These areas should be treated as regulatory floodway. See: A-8, A-9, D-10 [FEMA, in conjunction with state and local partners]	*Areas subject to flow path uncertainty, erosion and debris are high hazard and should be clearly dealt with in a manner to minimize exposure and risk, as well as minimize impacts on other properties and people.*
N-3 HYDROLOGIC AND HYDRAULIC MODELS a) The NFIP and states should pursue the use of the most appropriate technology to update hydrologic and hydraulic methods or models for arid regions when determining the risk of flooding, erosion and debris flow hazards in arid regions, including alluvial fans and post-wildfire conditions. b) The resulting predictions of depth and velocity from a) should be required to be verified with indirect methods at key locations. See: A-8, A-9 [FEMA, in conjunction with state and local partners and expert NGOs]	*Due to unique circumstances prevalent in arid regions, FEMA should encourage the use of stochastic numerical models to better simulate location, extent and depth of flooding in areas of flow path uncertainty. Parallels exist in other countries and their experience may be applicable to arid regions in the US.*
N-4 The NFIP should develop floodplain management techniques which address wildfire, flood and erosion cycle hazards experienced in the arid regions. [FEMA, in conjunction with state and local partners and expert NGOs and academia]	*Best management practices will vary, as appropriate, amongst various arid regions and amongst arid region hazards.*
Arid Regions Research & Development	
N-5 RESUME NFIP RESEARCH & DEVELOPMENT FOR ARID REGIONS There is a critical need to resume the arid regions research that was started with the 1985 DMA Consulting Engineers report to	*Continued research and development of models and management approaches are essential in all flood risk areas, but especially in arid regions, where the science is newer and evolving.*

FEMA and the 1996 NAS study. A starting point for resuming this effort may include: a) Review the effectiveness of present identification, characterization and mapping guidelines in Appendix G. Identify pros and cons. b) Collect data on alluvial fan flooding mitigation efforts utilized in the arid regions. Develop options for post-construction performance of these features; identify pros and cons. c) Identify specific aspects of Appendix G guidelines and mitigations efforts, which need improvement and/or further research and development. d) Establish, in light of recent improvements in modeling software, clear guidance and policy on the applicability of different software on active and inactive alluvial fan flooding areas, and establish different classifications for use of these software for different settings, if necessary and appropriate. e) Establish policy and guidance to ensure that new technology used to determine flood hazards is consistent with the local and national floodplain requirements, and is not improperly used (such as ignoring the flow path uncertainty) to allow development in areas where high risk alluvial fan flooding is possible. f) Coordinate with USACE and other agencies to develop guidance on the appropriate application of two-dimensional models on areas of dynamic flow paths. This would produce defensible recommendations with no conflicting interests in the determination. [FEMA, MitFLG, USACE, USGS, states, expert NGOs]	*This would be a significant effort, but is essential if the nation is to manage the increasing risk in arid regions of the nation where we see greatly increased population and development pressure—thus increased flood risk. Risk is the product of probability x consequences, and the latter is especially climbing rapidly.*
N-6 Establish a streamlined process (through a LOMC or other mechanism) for NFIP communities to update FIRMs after major flood-disaster storm events that cause erosion and new flow paths that increase flood risks vertically and/or change them horizontally. See: A-8, A-9 [FEMA, mapping partners]	*Such a streamlined process is critical considering that in the past the NFIP has allowed delineation techniques to be used for alluvial fans in arid regions that failed to recognize flow path uncertainty. This results is unintentionally reducing the extent of predicted SFHAs and/or under predicting volumes and depths of flooding and debris.*

Section 5 (O, P & Q): Flood Risk Governance

Effective management of flood risk must truly be a shared responsibility between all levels of government, private sector and citizens. Citizens often only avoid high flood risk areas or mitigate their risk if the actions of government either provide the incentives or disincentives to manage their own risk. If governments make it clear to those who want to build or live in high risk areas that they are on their own, they will likely either avoid those areas altogether, or build only in lower risk areas or in ways that will help them quickly recover from flooding. There have been and continue to be a number of national policies that lead people to believe someone else will bear the consequences of flooding. Examples include subsidized flood insurance, taxpayer funding for flood "protection" measures like levees and dams or beach nourishment, and disaster programs that people incorrectly believe will make them whole after a flood, so they do nothing to avoid or mitigate their flood risk.

A number of federal approaches have been tried over the last century or more to reduce flood damages and costs, including using taxpayer money to build levees and dams, requiring some property owners living in high flood risk areas to buy flood insurance to pay some of the costs of flooding, and to provide cost sharing grants to help mitigate flooding to some buildings and public facilities. These efforts have not reduced the cost of flood disasters over that century plus period, either because they are not adequately designed or implemented or because their effectiveness is offset by other programs that reward developing in flood risk areas.

Each level of government has a key responsibility in managing flood risk. The current governance model relies too heavily on federal actions or funding, leaving other levels of government to believe they have no central role in reducing flood costs, or in hoping the federal taxpayer will bail them out of the consequences of flooding no matter how many decisions they make to increase the risk and consequences of flooding. An example is the use of federal taxpayer dollars that build or rebuild local infrastructure in flood hazard areas. Federal agencies were directed not to take actions that would increase flood risk and costs 40 years ago, but that has not been as effective as planned, pointing out the need to reinvigorate the effect through new FFRMS for federal actions and federal grants.

ASFPM believes the most effective management of flood risk will only happen if states and communities have the capability and primary responsibility to manage that risk. That suggests federal programs need to focus on building state and local capability. Only states have constitutional authority to regulate and enforce land use and building codes/standards, ensure safe flood control structures like levees and dams, and to enact, delegate, monitor and enforce appropriate local/regional flood risk management approaches.

The current federal top-down approach for managing flood risk must evolve to a federal role of technical assistance to assist states and communities manage flood risk. Some federal agencies are already doing that, others are moving in that direction, but it seems some federal agencies still feel they need to be making all decisions instead of building state and local capacity to do so. Some federal programs focusing on highways and clean water are actually delegated to the states, with federal oversight and periodic review. Flood risk management would work effectively as a shared responsibility, also with a focus on state and locals taking responsibility and sharing the bulk of costs of not doing so, but it must be a goal and focus of all federal flood risk programs.

Subsection O. Federal Collaboration and Leadership are Essential

Recommendation	Explanation/rationale
Flood Policy Coordination, Oversight and Funding	
O-1 DEVELOP AND IMPLEMENT A FFRMS a) The administration must finalize the FFRMS to be used for federal grants and assistance. b) All federal disaster assistance and federal grants for any purpose must be contingent on compliance with a FFRMS that ensures any federally-assisted construction or re-construction has reduced/no future flood risk, thus saving federal taxpayers the cost of repeatedly paying for the same disaster costs. See: G-6, D-3, D-8, P-2, J-2, J-3, F-4, F-11, C-1, C-5, C-6, H-3 [MitFLG, CEQ, NSC, US Water Resources Council (WRC)]	*The new FFRMS is in EO 13690 that updates EO 11988.* *A federal FFRMS was in place following Hurricane Sandy in the northeast in 2012, which had to be met in re-construction in order to access federal funding. Such a standard protects the federal taxpayer investment in construction and re-construction so this taxpayer funding is not repeated over and over.* *There are some pieces of this in various documents like Executive Orders 11988, 11990, and the EOs on Resilience and climate adaptation, but a comprehensive standard pulls it all together.*
O-2 Require all federal agencies to issue updated guidance on EO 11988 and EO 13690 and assign an oversight agency to evaluate all agency(s) compliance with those federal EOs. This guidance must ensure 500-year protection for critical facilities; ensuring access to and fully operational critical facilities during 500-year floods; avoiding floodplain unless no alternative exists; using future conditions in decision-making; avoiding adverse impacts to neighboring properties and using nature based options wherever possible. See: G-6, D-9, J-2, F-4, F-12, C-5, C-6, H-3 [administration, CEQ, OMB, MitFLG, WRC]	*Agencies guidance on EO 11988 is now decades old and must reflect new laws, new EO 13690 and other EOs on resilience, sustainability and climate change, with stronger mechanisms for monitoring, reporting, enforcement and accountability. For example; require that all federally-funded transportation projects incorporate comprehensive flood and storm hazard mitigation design standards.*
O-3 Provide sufficient and reliable funding for federal programs that encourage use of future conditions and resilience and generate long-term reduction of flood losses and lead to resilient communities, e. g., technical assistance and state/local capability-buildings. See: P-4, F-9, F-11, C-3 , H-1 [administration, Congress]	*Implementation of nonstructural measures, which result in permanent flood risk reduction measures, especially relocation and buyout (this is a taxpayer one and done). Building elevation [if less than 15 feet] is another preferred measure.*
O-4 Establish and fund a high-level federal coordinating mechanism for federal water resources policy to not only coordinate federal policy, but to cut through the stove pipes when federal agencies deliver programs/services to state and community partners. See: L-4 [administration, Congress jointly]	*Since the demise of WRC, there is no coordinating mechanism for federal water resource policy. Some claim Congress does that, but various aspects of water policy are stove piped in a number of congressional committees with limited coordination, which then becomes reflected in agency programs/actions.*
O-5 Provide adequate resources and opportunities for federal interagency coordination entities (MitFLG, FIRM-TF) to collaborate with state and local partners. [administration, Congress, MitFLG, FIFM-TF, all agencies]	*These entities are performing interagency coordination among the federal family, but are not yet reaching out effectively to state and local government partners who implement these programs at the ground level.*

O-6 Provide federal leadership and support for building capability for sustained state and local flood risk management and mitigation programs and funding that can complement federal investments in hazard mitigation. See: Section S and F-2, F-5, H-16 [MitFLG, FEMA, USACE, EPA, NOAA]	*A number of states have floodplain management programs stronger than the NFIP, and some have state mitigation funds that can match FEMA mitigation funds, or stand-alone state funded mitigation. All of these funds need to be leveraged.*
O-7 STRENGTHEN FEMA a) Restore FEMA to independent agency status to allow greater flexibility in achieving their mission objectives. b) Ensure that flood loss reduction concerns are addressed throughout the national planning frameworks including the National Response Framework and National Mitigation Framework. c) Ensure FEMA director has/uses discretionary authority (with input from localities and the state) to require communities to use advisory maps and advisory BFEs post disaster. It should also be a requirement for CRS communities to use advisory or preliminary maps as best available data. See: G-5, O-1 [FEMA, MitFLG]	*FEMA continues to have issues related to being part of DHS – from the DHS "tax" to needing to conform with broader DHS programs. In the post-disaster environment, this complicates and delays programs like HMGP and does not allow FEMA to be nimble and effective.* *The national level frameworks that exist today are collectively called the National Planning Frameworks.* *This could also be covered with a FFRMS developed by MitFLG and outlined in O-1.*
Adjusting Existing Federal Programs	
O-8 FEMA should establish a work group to assess and implement recommendations of their 2012 report on "Rethinking the NFIP." See: D-1, F-16 [FEMA, state and local partners]	*Some of these recommendations will require FEMA to develop options, costs and pros and cons and ask Congress to pass legislation.*
O-9 Remove any impediments to USACE performing nonstructural projects. See: H-3, I-2, G-6, H-18 [USACE, MitFLG, CEQ]	*Some district offices say the requirement that sponsors must do land acquisition instead of straight cost sharing prevents them from doing acquisition/relocation projects.*
O-10 Develop and implement effective monitoring, probation and suspension guidance and standards to improve NFIP compliance for community and state participation. [FEMA, states]	*FEMA has been lax in ensuring communities and states are properly monitored, placed on probation and suspended from the NIFP when failing to meet their obligations under the NFIP. This is critical to protecting federal taxpayers.*
O-11 Deny federal assistance or cost sharing for public infrastructure that would encourage development in currently undeveloped flood risk areas. See: F-4 [MitFLG, USACE, OMB, FEMA]	*Current guidance for USACE projects, such as levees, supposedly have this condition, although there have been a number of projects that violate those provisions.*
O-12 Adopt a watershed-based, comprehensive approach for all federal water resources activities and programs in collaboration with the states. Encourage this through	*EPA and NRCS have been doing this since the 1990s, but key agencies like USACE and FEMA struggle with this.*

existing programs that may have the same goals, such as the USACE Silver Jackets program. See: P-6, L-2 [administration with CEQ lead]	
O-13 Support professional certification programs for floodplain managers, insurance adjusters, agents, and others; provide more insurance-related training via the NFIP training contractor and states. See: D-7, P-9, E-5 [FEMA, WYOs, realtors, home builders, states]	*A number of those in the chain of decisions/advice to property owners lack training in flood insurance rates, maps and NFIP standards and regulations, and importantly in flood mitigation options.*
O-14 Enforce all lease restrictions on federally-leased flood prone land, especially denial of flood insurance, and non-renewal after expiration of the lease. See: F-16 [General Services Administration (GSA), USACE, FEMA, National Park Service (NPS), OMB]	*The law supposedly does not allow flood insurance on federally-leased flood prone land, or renewal of such leases. Both provisions have been violated by either Congress or the agency(s).*
Consideration of New Federal Approaches	
O-15 Support examinations of alternative paradigms for national flood policy and programs, including governance, mapping, avoidance of flood risk areas and flood insurance See: G-2,E-13, E-14, Q-8, H-16 [administration, Congress, academia, NGOs]	*This starts with admitting the current system of NFIP, disaster relief, water resources policy and other approaches to managing flood risk have not reduced flood damages or disaster costs over the last 80 years, so the need to explore alternatives.*
O-16 Perform a study of shifting national flood risk management to a national model that delegates floodplain management authority to states, with incentives and adequate funding provided through all federal grants, disaster relief, etc. See: G-2	*This would require tying state's effectiveness in managing flood risk to disaster relief, not to the availability of flood insurance. It might also mean having no or little federally-backed flood insurance, but leaving flood insurance to the private insurance and re-insurance market.*
O-17 PRIVATE SECTOR INVOLVEMENT/INVESTMENT a) Involve/reward private sector investments and actions in managing flood risk by establishing strong federal flood risk management rules that are based on the principles of long-term resiliency – including from climate change, use of natural ecosystems for resilience/sustainability and flood damage reduction. b) Explore the federal government's use of various natural resource exchanges and markets, such as habitat exchanges, carbon markets and use of easements to riparian/wetland or coastal land owners. See: E-14, Q-8	*The private sector investment market has shown some interest, but it needs clear rules showing its investment will be protected from foreseeable changes that present a risk to that investment. This would include assurances that resilience for future conditions is addressed.* *These approaches would focus on maximizing natural ecosystems that not only attenuate flooding naturally, but also address the issues that are identified as one of the causes of increasing the intensity of rainfall and storms.*

Subsection P. Building State & Local Capability Reduces Long-term Costs

Recommendation	Explanation/rationale
Oversight Actions to Build State Capability	
P-1 Work with states to examine and upgrade their entire suite of flood risk management policies and programs: floodplain regulations, building codes, dam and levee programs, urban wildfire areas, erosion zones, intra-agency coordination, laws, executive orders, where state funds are spent in flood risk areas, grants, their mitigation efforts, etc. [FEMA, USACE, ASFPM Foundation, ASFPM chapters, ASFPM]	*Flood risk in the nation will only be reduced when states accept their responsibility to lead the effort.* *The ASFPM Foundation has developed a process to help states conduct a state symposium on flood risk management to identify gaps and opportunities; follow up efforts at the state level move the discussion to state decision makers with assistance available.*
P-2 Require states to issue, update and enforce effective executive orders or laws on floodplain management that reduce federal and state taxpayer disaster and flood insurance claims. See: O-1, G-4 [FEMA, ASFPM, ASFPM chapters and foundation]	*States, not the federal government, have the constitutional authority to most effectively reduce flood damages and risk, which are land use and building codes.* *This could be one of a number of factors in a sliding cost share for disaster relief and points in grant awards, etc.*
P-3 DELEGATION OF PROGRAMS TO QUALIFIED STATES a) Explore use of true delegation model to move responsibility for NFIP activities to qualified states (mapping, monitoring communities for compliance, technical assistance, training, etc.). b) Delegate (with effective monitoring) to qualified states the administration of mitigation programs HMGP, FMA, PDM and environmental reviews for mitigation projects. See: A-15, F-2 [FEMA, states]	*Other agencies, such as EPA and DOT, fully delegate programs to qualified states; then the federal agency monitors and evaluates the work by the state to determine if the delegation should continue. Stepped delegation should be considered as the state gains more capability and based on effectiveness of their effort.* *This is necessary to eliminate duplication of effort and to provide knowledgeable localized expertise that will streamline and speed up mapping, mitigation and assistance to communities.*
P-4 Support and provide incentives to states and locals to encourage progressive state and local programs and activities, including NAI approaches (e.g. explore allowing states and counties with land use authority to participate in the CRS program). See: O-4 [administration, FEMA, MitFLG, states]	*While the benefits are many, a number of states do not invest in flood risk management/reduction because they either think it is the job of the federal government or they think federal taxpayers will bail them out after disasters, or they do not see an immediate return on investment. Any steps that lead to stronger state and local programs are useful.*
P-5 Require as condition of certain grade in CRS, or provide incentives to encourage communities to integrate floodplain management with land use and watershed conservation plans. Require in hazard mitigation plans and for credit of flood plans in CRS. See: G-4 [MitFLG, FEMA, EPA, NOAA, HUD]	*Mitigation plans are increasingly tied to land use or local comprehensive plans. Water conservation planning is more difficult as it differs across the country and communities. However, EPA and other agencies now have resilience programs that can tie into mitigation planning.*

P-6 Analyze "effective state programs" and work with states to encourage states to move beyond basic and toward model flood risk management programs, including an analysis of existing similar programs, such as the USACE Silver Jackets program. See: O-12, H-16 [ASFPM, ASFPM chapters]	*There should be some minimum standards for state programs, which ASFPM should work with states/feds to create and promote. This could consider a scoring program gold, silver, bronze, dirt levels of state programs.*
P-7 Support state efforts to require the floodplain administrator in participating NFIP communities to be a CFM. See: D-6, P-11, Q-7 [FEMA, ASFPM, states, ASFPM chapters]	*Some credit is given in CRS for having a CFM. A number of states are interested in pursuing this avenue with their Legislature, and assistance from FEMA and ASFPM is needed.*
P-8 Work with states on transfer of property laws to incorporate flood risk disclosure for property transfers. [ASFPM chapters, state, FEMA]	*There can also be incentives for effective laws or regulations like this. These could be great incentives if states were eligible to join CRS.*
P-9 Work with state insurance and realtor regulators to integrate NFIP and flood risk management into on-going (yearly or biennial) CEC requirements for insurance and real estate agents selling flood insurance and to build agent training capacity in the state. See: D-7, O-12, E-5 [ASFPM chapters, state floodplain mgt. offices, FEMA]	*Training of insurance agents becomes even more critical as flood insurance premiums move toward actuarial. Knowing the accurate current and future premiums as well as mitigation options and costs is essential for property owners to make good property investment decisions.* *This should be part of an effective state program.*
Utilizing states to assist communities-CAP	
P-10 Enhance the FEMA Community Assistance Program (CAP) as an effective means to build state and local capability and to provide monitoring and technical assistance to communities participating in the NFIP. [FEMA, states]	*Building state capability in all aspects of managing flood risk (mapping, regulation, monitoring, evaluating, mitigation, community resilience) is consistent with the vision that managing flood risk is primarily the role of state and local governments and their subsets. As disasters continue to increase FEMA regional staff become more and more consumed with post disaster duties, and with other duties related to the placement of FEMA in DHS. It is essential states assume the role of working with communities. This allows communities to build on that day-to-day working relationship with the state.*
P-11 Encourage states to view CAP as auxiliary funding to state floodplain management programs, not sole source. Require one full time state-funded CFM position to receive any CAP funds. See: P-7, Q-7, D-6 [FEMA, states]	*State leadership needs to understand that managing flood risk is their responsibility. Federal disaster funds and grants being tied to effective state programs will make that connection more clear.*
P-12 Redesign CAP and other delegation programs to emphasize building state and local capability instead of simply buying state services.	*FEMA staff must recognize that states are the logical entity to provide technical assistance, training and monitoring to communities. Building state flood risk*

[FEMA]	*management programs for those services means those services will be there permanently. Using contractors for those type services does not result in permanent capability to service communities.*
P-13 Negotiate CAP participation individually with each state and require cabinet or governor-level commitment from state, using many forms of federal funding as an incentive (with each change of state administration). [FEMA, states]	*CAP agreements are often between the FEMA region and working level state staff; this does not get buy in or commitment from the governor or high level state officials.*
P-14 FEMA should develop and implement a CAP-SSSE type program to assist states in building state hazard mitigation capability. Program should include an agreed-upon plan between state government and FEMA. [FEMA, Congress, if needed]	*It is essential that states, locals and citizens understand that flood risk mitigation is not a federal responsibility—it is primarily the responsibility of state and local governments (or subsets thereof) and those who choose to build and live at flood risk.*
P-15 Allocate CAP funding based on NFIP and flood risk management-related needs, with annual inflation-indexed increases; and provide funding for two years at a time. [FEMA]	*FEMA will need to adjust the grant cycle for CAP-SSSE – it is now out of sync, and states wait for 6-9 months into the year before funding is awarded for that year. Funding should be for two years or more-- as are the CTP grants.*
P-16 Allow states to allocate up to 30 percent of CAP funding to state-selected non NFIP, but effective flood loss reduction activities (not projects). If states can verify the benefit of these other actions, it could be cost effective to the NFIP and disaster funding. [FEMA, states]	*Examples of such activities could include working on developing and implementing and training on stronger building codes, governor executive orders or other state actions that reduce flood insurance claims.*
P-17 All FEMA regions should annually host meeting/training with state NFIP coordinators and SHMOs and ASFPM chapters, ASFPM regional directors, mapping partners, state, local and regional CTPs, and local NFIP and mitigation partners. [FEMA]	*An effective NFIP and an effective mitigation program work hand in hand to manage flood risk. Cross training and collaboration of these staff are critical to FEMA's success and the state's success.*

Subsection Q. Partnerships & Incentives Create a Shared Approach to Managing Flood Risk

Recommendation	Explanation/rationale
Q-1 Congress should amend the Disaster Relief Act and WRRDA (USACE authority) to apportion costs, responsibilities, and roles among federal, state, local and tribal governments, and the public commensurate with risk (for example, a sliding cost share could be used as an incentive for state and local governments; to reward them for actions that reduce flood risk). The same type of incentive could be enhanced in the flood insurance policy for actions by property owners that reduce flood risk and claims to their building. See: O-1–13, P-1–17, G-2, G-4, I-1 [Congress, FEMA]	*Create financial incentives for communities and states, such as: basing all federal flood-related assistance to states and localities on a sliding cost-share: the more mitigation, the smaller the non-federal share; nonstructural measures and those that retain/enhance natural systems should always get a larger federal share. A set formula, based on savings to the federal taxpayer would be established so state and local governments can calculate their return on investment.*
Q-2 Strengthen collaboration, coordination and partnerships among federal agencies and across federal, state, local and tribal jurisdictions and economic sectors to reduce future flood risk and disaster costs. [MitFLG, FIFM-TF, states, NGOs]	*So called "silos" among and within federal agencies must be removed to ensure alignment of policies, practices, and resources for current and future flood risk management. Private sector and NGO involvement must be encouraged as governments alone cannot solve these problems.*
Q-3 Amend existing law so that communities would be allowed to bank mitigation expenditures as non-federal share of next disaster. See: F-9 [Congress]	*The mitigation measures would have to meet existing BCA and other requirements, and as such will save taxpayer more funds in the future.*
Q-4 Work with states, locals and tribes, as well as other federal agencies to improve and promote the flood resilience checklist that is part of the Smart Growth initiative. [EPA, MitFLG, FEMA, USACE, NOAA, DOT]	*Tools, such as the flood resilience checklist for communities or tribes can be extremely useful. The tool can be enhanced through collaboration with all government levels and the private sector.*
Q-5 Support and fund incentives for sustainable uses of flood prone agricultural lands. See: K-1, K-2, F-9 [USDA, EPA]	*These can range from sustainable crops to permanent floodplain easements.*
Q-6 Explore the impacts of modifying how flood losses are covered in the Multiple Peril Crop insurance to incentivize appropriate and sustainable agriculture and land uses within floodplain lands and to minimize the chance that farmed floodplain land is not converted to residential/commercial development. Continue to tie all such taxpayer support to producer conservation compliance as well as compliance with all applicable federal and state regulations. See: Q-6 [USDA, states]	*There is a delicate balance between avoiding residential and commercial development in floodplains and allowing suitable and sustainable agricultural use of flood prone lands while ensuring the continued use of flood prone lands to provide natural functions that reduce flood losses and provide multiple ecosystem benefits.*

Q-7 Make NFIP CAP funding contingent upon the state's provision of one fully funded professional full-time position in floodplain management—who should be a CFM. See: P-7, P-11 D-6 [FEMA, states]	*Exceptions could be made only if the state can demonstrate it is spending an equivalent or greater amount of funding for state staff on other actions that FEMA agrees reduce flood risk and NFIP risk.*
Q-8 Encourage market-driven private-sector incentives for mitigation. See: O-15, O-17 [MitFLG, FEMA, Congress]	*This can be done with building codes recognized by private insurance carriers or other means. Newly suggested rules for infrastructure bonds move in the right direction.*
Q-9 Provide incentives (disaster relief, mitigation grants and other grants, as well as utilizing/expanding CRS credits) for all state and local floodplain managers to be CFMs. See P-7 [FEMA, USACE, NOAA, HUD]	*Local floodplain managers had limited training and status prior to the CFM program. Having that trained professional at the local level helps communities make better flood risk decisions in support of community resilience.*
Q-10 Federal agencies should encourage/incentivize integration of certification programs for the International Building Codes and for floodplain management. [FEMA, HSS]	*Too often local building officials and the permit officials who issue floodplain permits are stove piped at the state and local level, whereas close collaboration saves money and time.*
Q-11 Create incentives in federal programs (CRS, disaster relief, grants, etc.) for states that develop and enact sufficient enabling authority for regions and communities to develop/integrate stormwater utilities or similar mechanisms that can provide tools, assistance and resources for an array of flood risk management and loss reduction actions. See: F-9, L-4 [MitFLG, administration, FEMA, USACE, EPA]	*Too many states recreate the federal stove pipes for programs dealing with water quantity and water quality, and that is a barrier to effective management of both. The federal government cannot dictate this, but can provide incentives or make it a condition of grants, etc.*
Q-12 Reform the casualty loss deduction to better target the deduction as well as incentivize mitigation such as limiting the number of times a person could claim the deduction without first mitigating as well as a means tested system to target claimants who truly need assistance. [Congress]	*The casualty loss deduction for flooding costs taxpayers lots of money, with much of it going to higher income property owners in very high value buildings in high risk areas such as coastal areas. The concept here is to remove incentives for people to build in these high risk areas where they can externalize their cost to the taxpayers.*
Q-13 Develop a hazard mitigation tax credit much like energy efficiency tax credits that are given to property owners. Additionally or alternatively, allow for tax advantaged disaster savings accounts. See: F-9 [Congress]	*The concept is to provide a means where a property owner can save for or get a tax credit for actions that mitigate their hazard risk. As flood insurance rates move toward full risk rates, property owners can easily determine their return on investment for such actions.*
Q-14 Provide specific IRS guidance more broadly exempting cost effective mitigation assistance and funding from federal taxes. Currently only FEMA mitigation programs have a specific tax exemption in federal law. See: F-9 [Congress]	*If a community or state provides mitigation funding that meets the federal BCA standards to reduce future taxpayer costs that grant funding should be exempt from federal taxes.*

GLOSSARY

44 CFR 60.2—Minimum Compliance with Floodplain Management Criteria.
44 CFR 60.3—Floodplain Management Criteria for Flood-Prone Areas.
44 CFR 60.3(c)(10)—"When the Federal Insurance Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community's FIRM and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community's FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall: …(10) Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1–30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community."
100-year flood—The flood having a 1 percent chance of being equaled or exceeded in any given year, also known as the "100-year" or "1 percent chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding.
Advisory Committee on Water Information's Subcommittee on Hydrology (ACWI-SOH)—ACWI is an interagency group that represents the interests of water-information users and professionals in advising the Federal Government on Federal water-information programs and their effectives in meeting the Nation's water-information needs. The subcommittee on hydrology focuses specifically on improving the availability and reliability of surface-water quantity information needed for hazard mitigation, water supply and demand management, and environmental protection.
Advisory map, advisory base flood elevations—Revised base flood elevations issued by the Federal Emergency Management as a result of new flood-frequency analyses conducted after Hurricanes Katrina and Rita. The advisory elevations are significantly higher than the previous ones, and extend farther inland. The advisory elevations, and the maps that depict them, are intended to give local officials more accurate data on which to base repair and rebuilding decisions.
AIR—American Institutes for Research.
ALE—Additional living expense insurance coverage. This type of insurance coverage reimburses the policy holder for the cost of maintaining a comparable standard of living following a covered loss (i.e. flood or fire) that exceeds their normal expenses.
Alluvial fan—An area at the base of a valley where the slope flattens out, allowing the floodwater to decrease in speed and spread out, dropping sediment over a fan-shaped area.
AMS—American Meteorological Society.
Arid regions—Parts of the United States that receive an average of less than 20 inches of rain annually. The geomorphology, soils, and vegetation characteristic of these arid areas combine to produce flood problems that differ in many ways from those of more humid areas.
ASCE (24-14)—A publication by the American Society of Civil Engineers which outlines standards for flood resistant design and construction.
Base flood elevation—The elevation of the crest of the base or 100-year flood, which is the level of flood that has a 1 percent chance of being equaled or exceeded in any given year. Also referred to as BFE.

Benefit-Cost Analysis—A technique for evaluating a project or investment by comparing the economic benefits to the economic costs of an activity. Often times, benefit-cost analyses are used to determine the merit or a project or make decisions between potential alternatives based on their cost efficiency.
BI—Business Interruption insurance coverage. This type of insurance coverage covers a business's lost income when damages, caused by a covered phenomenon, slow or entirely halts business operations.
BuRec—United States Department of the Interior – Bureau of Reclamation.
Bureau and Statistical Agent (B&SA)
CELCP—Coastal and Estuarine Land Conservation Program.
Coastal Barrier Resources System (CBSR)—A set of "undeveloped coastal barriers" and "otherwise protected areas" along the U.S. coast (including the Great Lakes) designated by Congress under the Coastal Barrier Resources Act of 1982 (CBRA). Most expenditures of federal funds are prohibited within the Coastal Barrier Resources System.
Code of Federal Regulations (CFR)—The codification of the general and permanent rules (sometimes called administrative law) published in the Federal Register by the departments and agencies of the Federal Government.
Community Assistance Program (CAP)—FEMA run disaster assistance programs targeted towards communities. See: CAV and CAP-SSSE.
Community Assistance Program – State Support Services Element (CAP-SSSE)—A FEMA led program which provides funding to states to provide technical assistance to communities in the NFIP and to evaluate community performance in implementing NFIP floodplain management activities.
Community Assistance Visits (CAVs)—A scheduled visit to an NFIP community for the purpose of conducting a comprehensive assessment of the community's floodplain management program and of its knowledge and understanding of the floodplain management requirements of the NFIP and to help a community to fix program deficiencies and violations. CAVs are frequently conducted by the State or FEMA.
Community Development Block Grant Disaster Recovery Program (CDBG – DR)—A grant program managed and administered by the U.S. Department of Housing and Urban Development. This grant program is intend provide assistance to cities, counties, and States as they recover from presidentially declared disasters, especially in low-income areas.
Community Rating System (CRS)—A program developed by the Federal Emergency Management Agency to provide incentives for those communities in the National Flood Insurance Program that have gone beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. Policyholders in CRS-participating communities receive up to 45 percent discounts on their flood insurance premiums.
COOP—Continuity of Operation Plans.
Cooperating Technical Partners Program (CTP, CTP Program)—A program which facilitates the creation of partnerships between the Federal Emergency Management Agency (FEMA) and participating NFIP communities, regional agencies, state agencies, tribes and universities that have the interest and capability to become more active participants in the FEMA flood hazard mapping program.
Coordinated Needs Management Strategy (CNMS)—FEMA coordinates the management of mapping needs using a comprehensive approach, referred to as the Coordinated Needs Management Strategy. This strategy uses existing digital map data to inventory and manage flood map update issues and support Flood Insurance Rate Map revisions and production planning activities.
CEA—The President of the United States Executive Office – Council of Economic Advisers.

CEC—Continuing Education Credit.
CEQ—The President of the United States Executive Office – Council on Environmental Quality.
Corps (USACE)—United States Army Corps of Engineers.
Critical facilities, critical use facilities—Structures or facilities that meet one or more of the following criteria: (1) produce, use, or store highly volatile, flammable, explosive, toxic and/or water-reactive materials; (2) hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood; (3) police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood; and (4) public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during, and after a flood.
CRP—USDA Farm Service Agency - Conservation Reserve Program.
CWA—Clean Water Act.
CZMA—Coastal Zone Management Act.
CZM—The State agency which voluntarily partners with the Federal government to implement the CZMA.
Debris flow—A "river" of rock, earth, and other debris, saturated with water, which develops during and after intense rainfall and flows downhill, often at rapid rates and without warning.
Department of Public Works (DWP)—A department within a local unit of government, tasked with the management and oversight of infrastructure projects, financed and constructed by the government, for recreational, employment, and health and safety uses in the greater community.
Depth-damage functions—A mathematical relationship between the depth of flood water above or below the first floor of a building and the amount of damage that can be attributed to that water; used in cost-benefit analyses and other decision making about flood damage.
Design Flood Elevation (DFE)—The regulatory flood and flood elevation used by the community or jurisdictional authority. The design flood elevation must be at or above the NFIP minimum BFE.
DHS—United States Department of Homeland Security.
Digital Flood Insurance Rate Map—A flood insurance rate map [see below] that either has been converted to or was produced through an electronic format.
Disaster Field Office (DFO)—The site out of which recovery operations are administered during a declared disaster.
Distributary flow system—A drainage pattern characteristic of some arid regions, in which channels of the waterway split and rejoin in a complex pattern; distributary flow is usually sheet flow with a strong channelized component.
DOC—United States Department of Commerce.
DOI—United States Department of the Interior.
DOT—United States Department of Transportation.
Elevation Certificate (EC)—A form used by communities participating in the National Flood Insurance Program to certify the elevation of a building in relation to the base flood elevation.
Emergency Management Assistance Compact (EMAC)—A Congressional ratified organization through which states provide and receive mutual support in the form of personnel, expertise, and resources after a disaster.
Emergency Support Function 14: Long Term Recovery—A subsection of the National Response Plan that provides a coordination mechanism for the federal government to assess the consequences of disasters and to coordinate the long-term recovery.
EPA—United States Environmental Protection Agency.

ESA—Endangered Species Act.

Emergency Watershed Protection Program (EWP)—A USDA NRCS-managed grant program which provides funding to help communities address watershed impairments that pose imminent threats to lives and property.

Environmental and Historic Preservation Program (EHP)—A program designed to ensure that the protection and enhancement of environmental, historic, and cultural resources is integrated into FEMA's mission, programs and activities. This program also works to ensure that FEMA's activities and programs comply with federal environmental and historic preservation laws and executive orders.

Executive Order 11988 (EO 11988)—Issued by President Carter in 1977, directing all federal agencies to avoid supporting, directly or indirectly, any long- and short-term adverse impacts associated with the occupancy and modification of floodplains; requires federal agencies to exercise leadership in reducing flood risk; minimizing impacts on safety, health, and welfare; and restoring and preserving natural values and functions of floodplains.

Executive Order 11990 (EO 11990)—Signed by President Carter in 1977, this Executive Order was passed in an effort to avoid the adverse impacts associated with the destruction or modification of wetlands.

Executive Order 13514 (EO 13514)—Signed on October 5, 2009. Executive Order 13514 introduces new greenhouse gas (GHG) emissions management requirements, expands water reduction requirements for federal agencies, and addresses waste diversion, local planning, sustainable buildings, environmental management, and electronics stewardship.

Executive Order 13653 (EO 13653)—Signed by President Obama on November 6, 2013, this Executive Order is enacted "in order to prepare the Nation for the impacts of climate change by undertaking actions to enhance climate preparedness and resilience." This Executive Order outlines Federal agency responsibilities in the areas of supporting climate resilient investment; managing lands and waters for climate preparedness and resilience; providing information, data and tools for climate change preparedness and resilience; and planning.

Executive Order 13690 (EO 13690)—A new Executive Order that modifies EO 11988 and establishes a new flood risk management standard for federal investments and programs. The strengthened standard gives agencies the flexibility to use one of three standards to establish the flood elevation and flood hazard areas to be used in siting, design and construction. They are: 1) Use data and methods informed by best-available, actionable climate science; 2) Build two feet above the 100-year (1%-annual-chance) flood elevation for standard projects, and three feet above for critical buildings like hospitals and evacuation centers; or 3) Build to the 500-year (0.2%-annual-chance) flood elevation.

Federal Coordinating Officer (FCO)—An individuals appointed by the President to manage Federal resources during a disaster.

Federal Flood Risk Management Standard (FFRMS)—See Executive Order 13690.

Federal Interagency Floodplain Management Task Force (FIFM-TF)—Authorized and established by Congress in 1975, the purpose of this task force is to carry out the responsibility of the President to prepare for the Congress proposals necessary for a Unified National Program for Floodplain Management.

FEMA—Federal Emergency Management Agency.

FHA—U.S. Department of Housing and Urban Development - Federal Housing Administration.

Flood Insurance Rate Map (FIRM)—An official map of a community, on which the Federal Emergency Management Agency has delineated both the Special Flood Hazard Areas and the risk premium zones applicable to the community. Most FIRMs include detailed floodplain mapping for some or all of a community's floodplains. In most cases, the date of the first FIRM issued to a community is the date the community entered the Regular Program of the National Flood Insurance Program.

Flood Mitigation Assistance (FMA)—Created by the National Flood Insurance Reform Act of 1994 to provide grants to communities for projects that reduce the risk of flood damage to insurable structures.
Floodway—The channel of a river or other watercourse as well as the adjacent lands that must be protected in order to ensure that the base flood can be discharged without increasing surface water levels above a specified elevation on-site or upstream.
Frazil Ice—A collection of loose, needle-shaped ice crystals which flow on the surface of a semi-frozen watercourse.
Flood Insurance Study (FIS)—The use of hydrologic and hydraulic models to model the 100 year flood event, determine Base Flood Elevations, and designate floodways and other flood risk zones. The results of flood insurance studies are portrayed on FIRMs.
Freeboard—An additional amount of height above the base flood elevation used as a factor of safety (e.g., 2 feet above the base flood) in determining the level at which a structure's lowest floor must be elevated or flood-proofed.
FSA—The United States Department of Agriculture Farm Service Agency.
Future conditions—The circumstances projected to exist within a community at a designated point in the future that will affect flooding; includes such factors as extent of urbanization, vegetative cover, population, stormwater capacity, sea level, impervious surface, etc.
GAO—The United States Government Accountability Office.
GIS—Geographic information system, a computer-based system for capturing, storing, analyzing and managing data and associated attributes that are spatially referenced to the Earth.
Green Infrastructure—A network of open spaces and natural areas (such as wetlands, parks, green streets, and forest preserves) that work together to naturally manage stormwater, reduce flood risk, and improve water quality.
GSA—General Services Administration.
Hazard Mitigation Assistance (HMA)—The boarder grant program through which FEMA administers HMGP, PDM and FMA funding.
Hazard Mitigation Grant Program (HMGP)—Authorized in 1988 by the Robert T. Stafford Disaster Assistance Act and administered by the Federal Emergency Management Agency, to provide grants to state and local governments to implement long-term hazard mitigation initiatives after a major disaster declaration.
Homeowner Flood Insurance Affordability Act (HFIAA)—Passed by Congress and signed in to law in 2014, this act repeals subsets of the 2012 Biggert-Waters Flood Insurance Reform Act.
HUD—United States Department of Housing and Urban Development.
ICC—Increased Cost of Compliance, a flood insurance claim provision that helps fund the cost of bringing a flood-damaged building into compliance with floodplain management standards.
Individual Assistance (IA)—A FEMA program created to help individuals that have suffered a loss as a result of a man-made or natural disaster. Types of assistance offered through this program include: temporary house, housing construction, disaster-related medical costs, funeral or burial costs, lost item replacement, moving and storage expenses, etc.
Individuals and Households Program (IHP)—Provides financial help or direct services to those who have necessary expenses and serious needs if they are unable to meet the needs through other means.
International Building Code (IBC)—A set of model building codes, developed by the International Code Council, which have been adopted across the vast majority of the United States. These model codes are intended to regulate all types of building construction except detached 1 and/or 2 family residences and townhouses.

International Green Construction Code (IgCC)—A set of model codes developed by the International Code Council, which seeks to uphold the standards laid out in the IBC, IRC, and other publications whilst also promoting safe and sustainable construction.

International Residential Code (IRC)—A set of model building codes for 1 and/or 2 family residences, which was developed by the International Code Council.

Joint Field Office (JFO)—A temporary Federal multiagency coordination center established locally to facilitate field-level incident management activities related to prevention, preparedness, response and recovery from a disaster. The JFO provides a central location for coordination of Federal, State, local, tribal, nongovernmental and private-sector organizations with primary responsibility for activities associated with threat response and incident support.

Letter of Map Amendment (LOMA)—An amendment, issued by the Federal Emergency Management Agency in letter form, to the currently effective Flood Insurance Rate Map, which establishes that a property is not located in a Special Flood Hazard Area.

Letter of Map Change (LOMC)—The set of ways by which the Federal Emergency Management Agency uses an official letter to make an amendment or revision to a Flood Insurance Rate Map; includes Letters of Map Revision and Letters of Map Amendment.

Letter of Map Revision (LOMR)—An official amendment, by letter, to the currently effective Flood Insurance Rate Map; issued by the Federal Emergency Management Agency and changes flood zones, delineations, and elevations.

Letter of Map Revision based on Fill (LOMR-F)—An official revision, by letter, to an effective National Flood Insurance Program map. A LOMR-F provides the Federal Emergency Management Agency's determination whether a structure or parcel has been elevated on fill above the base flood elevation and excluded from the Special Flood Hazard Area.

LiDAR—Light detection and ranging; a remote sensing system used to collect topographic data; a Lidar system includes an active sensor similar to radar (usually mounted on the bottom of an aircraft), that transmits laser pulses to a target and records the time it takes for the pulse to return to the sensor receiver.

Limit of Moderate Wave Action (LiMWA)—A line identifying the 1.5-foot wave height on coastal Flood Insurance Rate Maps. This line is intended to help community officials and property owners recognize this increased potential for damage due to wave action in the AE zone.

Low Impact Development (LID)—An approach to land management, development, and/or redevelopment that promotes the use and preservation of natural landscape features to manage stormwater.

LWCF—Land and Water Conservation Fund.

Map Modernization (Map MOD)—A multi-year initiative, funded by Congress beginning in 2003, to improve the nation's flood maps through digitization, updated techniques, and other methods.

Mitigation Framework Leadership Group (MitFLG)—A senior-level group that works to coordinate national-level mitigation activities and implement policies in consultation with other federal agencies and state, local, tribal and territorial governments.

Map Service Center—the official public source for flood hazard information produced in support of the National Flood Insurance Program.

Mitigation—The broad range of activities that can eliminate or reduce flood damage to existing or proposed land uses. Mitigation includes avoiding the impact, minimizing impacts, or compensating for impacts.

Monte Carlo simulation—A computerized technique that uses computational algorithms to model the behavior of a physical or mathematical system.

Municipal Separate Storm Sewer System Permit (MS4)—
NAFSMA—National Association of Storm and Floodwater Management Agencies**.**
NAIC—National Association of Insurance Commissioners.
NAS—National Academy of Sciences.
National Climatic Data Center—NOAA's National Climate Data Center.
National Flood Insurance Program (NFIP)—The program of flood insurance coverage and floodplain management administered under the National Flood Insurance Act and applicable federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.
National Inventory of Dams—A USACE-managed searchable inventory of dams in the United States which meet one or more of the following criteria: 1) High hazard classification - loss of one human life is likely if the dam fails, 2) Significant hazard classification - possible loss of human life and likely significant property or environmental destruction, 3) Equal or exceed 25 feet in height and exceed 15 acre-feet in storage, and/or 4) Equal or exceed 50 acre-feet storage and exceed 6 feet in height.
National Levee Inventory/National Levee Database—A USACE-managed searchable inventory of information about levees, which aims to support decisions and actions affecting levee safety.
National Levee Safety Committee (NLSC)—A committee of federal, state, local, and private sector members with the direction from Congress to prepare recommendations and a strategic implementation plan on a National Levee Safety Program.
National Marine Fisheries Service (NMFS)—NOAA's National Marine Fisheries Service.
National Response Plan—Establishes a comprehensive all-hazards approach to enhance the ability of the United States to manage domestic natural, technological, chemical, and terrorist incidents; specifies how and establishes protocols for the federal government's coordination with state, local, and tribal governments and the private sector during incidents.
National Streamflow Information Program (NSIP)—The U.S. Geological Survey initiative to operate and maintain approximately 7,300 streamgages nationwide to provide long-term, accurate, and unbiased information for water resources management.
NCOIL—National Conference of Insurance Legislators.
NED—National economic development, "increases in the net value of the national output of goods and services, measured in monetary units;" specified in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies as the objective of federal water resources projects.
NEPA—National Environmental Policy Act.
NERRS—National Estuarine Research Reserve System.
NFIRA—National Flood Insurance Reform Act of 1994.
NFMP—National Flood Map Program.
NGO—Non-Governmental Organization.
NOAA—National Oceanic and Atmospheric Administration.
No adverse impact—A principle fostered in floodplain management by the Association of State Floodplain Managers that calls for advance consideration of the potential negative consequences of any proposed development or floodplain-related activity, and taking steps to avoid or mitigate such consequences.
Nonstructural measures—Flood loss reduction approaches that address the susceptibility of people to flooding or modify the impacts of flooding.
NPS—U.S. Department of Interior - National Park Service.
NRCS—United States Department of Agriculture - Natural Resource Conservation Service.

NSC—National Safety Council.
NSF—National Science Foundation.
NTSB—National Transportation Safety Board.
NWS—National Oceanic and Atmospheric Administration – National Weather Service.
O&M—Operations and Maintenance.
Office of Emergency Management (OEM)—The state agency tasked with planning and responding to natural and mad-made disasters.
OMB—The President of the United States Executive Office – Office of Management and Budget.
OMRRR—Operation, maintenance, repair, rehabilitation and replacement requirements.
P.L. 84-99 (Public Law 84-99)—The U.S. Army Corps of Engineers' Flood Control and Coastal Emergency Act. Under the provisions of this public law, the Chief of Engineers is authorized to undertake activities including disaster preparedness, Advance Measures, emergency operations (Flood Response and Post Flood Response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water due to drought or contaminated source.
Post-wildfire conditions—The changed status of a watershed or portions of it after a fire, including altered soils and lack of vegetative cover, that act to modify runoff and flow regimes.
Pre-Disaster Mitigation program (PDM)—Administered by the Federal Emergency Management Agency to provide grants, on a competitive basis, to states, localities, and universities for hazard mitigation planning and projects before a disaster.
Preferred Risk Policy (PRP)—A type of flood insurance policy which offers multiple coverage combinations for buildings (and their contents) that are located in moderate-to-low risk flood zones (B, C, and X Zones).
Pre-FIRM—For insurance rating purposes, a pre-FIRM building is one that was constructed or substantially improved on or before Dec. 31, 1974, or before the effective date of the initial Flood Insurance Rate Map of the community, whichever is later. Most pre-FIRM buildings were constructed without taking the flood hazard into account.
Principles and Guidelines (P&G)—USACE is required to follow detailed procedures for benefit-cost analysis as described in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, issued in 1983, which states that the federal objective in water resources planning is to "contribute to national economic development," or NED. Contributions to NED are "increases in the net value of the national output of goods and services, measured in monetary units." Note that the Federal Emergency Management Agency is required to follow a different benefit-cost analysis, set out in Circular No. A-20, issued by the Office of Management and Budget.
Principles and Requirements (P&R); Principles, Requirements and Guidelines (PR&G) —Principles and Requirements are established pursuant to the Water Resources Planning Act of 1965. Their purpose is to provide a common framework for analyzing a diverse range of water resources projects, programs, activities, and related actions involving Federal investment as identified by the agencies in the context of their missions and authorities. These P&Rs apply to a broad range of Federal investments that by purpose, either directly or indirectly, affect water quality or water quantity, including ecosystem restoration or land management activities. The CEQ issued Interagency Guidelines which provided direction to agencies for developing agency specific procedures to implement these Principles and Requirements.

Privacy Act of 1974 (Privacy Act)—Established a code of fair information practices that governs the collection, maintenance, use, and dissemination of information about individuals that is maintained in systems of records by federal agencies.

Probable Maximum Flood (PMF)—The maximum runoff condition resulting from the most severe combination of hydrologic and meteorological conditions that are considered reasonably possible for the drainage basin under study.

Public Assistance Program (PA)—Provides reimbursement grants to local governments that were involved in disaster response and recovery operations or that suffered loss or damage to facilities or property used to deliver governmental-like services.

Rehabilitation and Inspection Program (RIP)—A program created through P.L. 84-99. All systems considered eligible for P.L. 84-99 rehabilitation assistance have to be in the Rehabilitation and Inspection Program (RIP) prior to the flood event.

Repetitive loss structure—Any building that has suffered four or more flood losses, or more than two losses that cumulatively equaled or exceeded the building's value, during any 10-year period.

Riparian—Generally relating to the transition zone between aquatic (specifically flowing water) and terrestrial ecosystems within which plants are dependent on a perpetual source of water.

Risk-based analysis—A method of studying proposed flood damage reduction projects, similar to traditional approaches but allows uncertainties in the fundamental data to be quantified and explicitly included in the evaluations of project performance National Flood Programs and Policies in Review - 2007 101 special hazards, special flood-related hazards—features of the local terrain or climate that accompany or aggravate flooding, such as alluvial fans, closed-basin lakes, ice jams, subsidence, or uncertain flow paths.

Risk Mapping Assessment Planning (Risk MAP)—A FEMA led program which provides communities with flood data and tools that they can use to make their local flood maps more precise, improve their local planning, and conduct more effective public engagement.

SHMO— State Hazard Mitigation Officer.

Small Business Administration Disaster Loans Program (SBA)—Provides disaster loans granted to businesses, non-profits, etc. that can be used to repair or replace items damaged or destroyed in a declared disaster including but not limited to: real estate, personal property, machinery and equipment, and inventory and business assets.

Special Flood Hazard Area (SFHA)—The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A. In coastal situations, Zone V is also a part of the SFHA. The SFHA may or may not encompass all of a community's flood problems.

State Coordinating Officers (SCO)—A Governor-appointed individual tasked with overseeing State disaster response and recovery.

Structural measures—Flood loss reduction approaches that use constructed measures to prevent flood waters from reaching people or property.

Subsidence—The long-term sinking of land level due to withdrawal of groundwater, draining of organic soils, or other causes.

Substantial damage (SD)—Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damage condition would equal or exceed 50 percent of the market value of the building before the damage occurred.

Substantial improvements (SI)—Any reconstruction, rehabilitation, addition, or other improvement to a building, the cost of which equals or exceeds 50 percent of the market value of the building before the start of construction of the improvement.

Technical Mapping Advisory Council (TMAC)—A committee of experts from various disciplines created pursuant to the National Flood Insurance Reform Act of 1994 to advise the Federal Emergency Management Agency on flood mapping standards, guidelines, and related issues.

Unique hazards—See special hazards.

USACE Silver Jackets—A program through which the USACE, FEMA, and other federal agencies partner with state agencies to address the State's flood risk management priorities through a formalized and consistent strategy for planning and implementing measures to the risk of flooding and other natural hazards.

USACE—See Corps.

USDA—United States Department of Agriculture.

USFWS—United States Fish and Wildlife Service.

USGS—United States Geological Survey.

TB 10-01—Technical Bulletin 10-01, describes the standards which need to be met in order to ensure that structures built on fill or near special flood hazard areas are: 1) reasonably safe from flooding, and 2) in compliance with the standards set by the National Flood Insurance Program.

TRIA—Terrorist Risk Insurance Act.

Tsunami—A large wave caused by an underwater earthquake or volcano that can raise water levels on the ocean shore as much as 15 feet.

Tennessee Valley Authority (TVA)—A corporation owned by the U.S. government tasked with the provision of electricity to seven southern states, flood control, navigation and land management for the Tennessee River system, and to assist states and local governments with economic development.

Watershed—An area of land surface that drains into a lake, stream, or other body of water.

WRC—Water Resources Council.

WRDA of 2007—Water Resources Development Act of 2007.

WRRDA—Water Resources Reform and Development Act of 2014.

WYO—"Write Your Own" insurance policy program. The Write Your Own Program was created in 1983 and allows participating property and/or casualty insurance companies to write and provide the Standard Flood Insurance Policy in their company name.

Zero-rise floodway—The channel of the stream and that portion of the adjoining floodplain which is necessary to contain and discharge the base flood flow without causing any increase in the base flood elevation; will always include the floodway as delineated under the National Flood Insurance Program, which allows a 1-foot rise.