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STATEMENT FOR THE RECORD

**On behalf of the
National Emergency Management Association**

**Submitted to the Senate Appropriations Subcommittee on Commerce, Justice, and Science
United States Senate**

***“National Water Hazards & Vulnerabilities: Improved Forecasting for Response &
Mitigation”***

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Introduction

Thank you Chairman Shelby, Ranking Member Shaheen, and members of the Subcommittee for holding this hearing today. As you stated, I am the Director of the Florida Division of Emergency Management and I am testifying before you as the Past President of the National Emergency Management Association (NEMA), which represents the emergency management directors of the 50 states, territories, and District of Columbia. I am pleased to be here to address water hazards and the role of forecasting in response and mitigation efforts.

As we examine the threats from various water hazards, I want to be sure we recognize the great work being done across federal, state, and local governments, private sector, and community based organizations. I also believe we have tools at our disposal that remain underutilized and there are existing strategies we can leverage to promote the efficient use of taxpayer dollars before a disaster.

Threats from Floods and Other Water Hazards

The challenge of dealing with water hazards in the United States continues to evolve. Communities in my state prepare for and mitigate against changes in sea level that impact coastal cities that are critical to our economic health. Drought conditions in the Plains have wreaked havoc on agriculture and exacerbated wildfires over the last few years. Extreme variations in snowfall rates have caused California to shift from historic drought to overflowing reservoirs in less than a year. Historic flooding from a limited-warning, no-name event impacted millions of people and caused devastation in Louisiana outside of the 100-year flood plain. These hazards will continue to evolve and emergency managers, my peers across the country, understand that we play a critical role in communicating risk, mitigating against future disasters, and working with partners across government, advocacy organizations, and the private sector to build effective coalitions to ensure that we are prepared for these risks.

Flooding: Threats related to flooding were on full display last year, representative of the fact the flooding is this country's most frequent and costliest disaster. According to MunichRE, 19 significant floods impacted the nation last year, the most in one single year since records began in 1980. There were 15 flood or climate-related disasters that exceeded \$1 billion per event and in total, these events resulted in the loss of 138 lives and cost over \$46 billion. In 2016, the expenses to the National Flood Insurance Program (NFIP) totaled \$4 billion, exceeding the premium dollars it had collected to cover those claims. Significant events in Louisiana, Texas, West Virginia, and the numerous other states impacted by flooding and storm surge illustrate the need for attention to the enormous economic toll flooding takes on coastal and inland communities.

Although improved warning systems have reduced loss of life to floods during the past half-century, economic losses have continued to rise due to increased urbanization and coastal development.

The National Flood Insurance Program plays a significant role in highlighting credible data and encouraging the use of technology to improve mapping of flood risk zones across the country. The general purpose of the NFIP is both to offer primary flood insurance to properties with significant flood risk, and to reduce flood risk through the adoption of floodplain management

standards. Generally, communities volunteer to participate in the NFIP in order to have access to flood insurance, and in return are required to adopt minimum standards. Better cooperation among FEMA, FIMA, NFIP, states, and locals to increase awareness of risks, urge adoption of standards that make structures insurable, and encourage risk reduction strategies that leverage critical data would help reduce the impact and cost of future floods.

It is absolutely critical that the NFIP be reauthorized by September 30th to ensure continuous coverage for existing policyholders and to provide stability for the housing market. While there are challenges related to affordability, underutilized or limiting policies, and the role of the private market, the program is essential to my state and many others across the country. The NFIP can be a force multiplier as we communicate risk and is one of the most local touchpoints the federal government has to move the needle on insured risk. The NFIP is not just an insurance program. It is a comprehensive flood risk management program. It helps communities make data-driven decisions and is essential for action that addresses risk and utilizes best-available data and science.

Two programs which could significantly reduce the cost of all disasters, not just flooding, but are underutilized are the Community Rating System of the NFIP, and the opportunity for states to earn 33% more post-disaster mitigation funding by having an enhanced mitigation plan approved by FEMA. Full participation in these programs by states would significantly improve their readiness by helping to put into practice well-researched and considered mitigation techniques. However, staffing and funding at the state and local level make participation in these programs difficult, and the reward is often too far removed from the risk to motivate those who choose to enact the program. These programs and others like them should be evaluated to determine how to improve the participation rates of eligible jurisdictions in order to maximize their impacts.

Storm Surge: Communicating the risks of storm surge is essential for coastal communities across the country. A majority of hurricane-related evacuation is based on storm surge forecasting and has undoubtedly saved lives. As the Country's coastal population and density continues to grow, the need to improve forecasting and messaging capability remains paramount.

Communicating vulnerability to the everyday American is a challenge. "Nearly three out of five [respondents to a survey on perceived vulnerability] have never heard or read an estimate of the potential storm surge risk in their area. A significant portion of the U.S. coastal population is not fully aware of their storm surge vulnerability. (Lazo and Morrow 2013)."

While we evacuate for storm surge, some are unaware that hurricane and tropical storms can also bring damaging freshwater flooding from heavy rainfall, which is something we do not necessarily evacuate people for during a hurricane event unless they are near a river. Freshwater flooding from hurricanes is a secondary hazard, but can be just as deadly and damaging as the coastal storm surge. Even if the storm is not a hurricane, tropical storms can be a major disaster (examples: Tropical Storm Fay 2008 and Tropical Storm Allison in 2001) due to the heavy rain threat.

This was also apparent in Hurricane Matthew in North Carolina. While high winds were not expected, heavy rain was anticipated and resulted in \$1.5 billion in damage to over 100,000

homes. However, since people's attention was on the hurricane and where it was heading, communicating the high flood risk was a challenge and 28 people died as a result. Rainfall-induced flood deaths occur in more tropical cyclones than any other hazard.

In 2014, the National Hurricane Center introduced a new Potential Storm Surge Flooding Map to improve the public's awareness of the potential impacts for an approaching tropical cyclone. However, due to computer processing limits, this map cannot be released until a Hurricane Watch is issued. Additionally, once it begins to be issued for a storm, updates remain out of sync with other storm related products.

Data and the Utilization of Technology to Communicate Risk

As in almost every other profession or discipline, emergency management practitioners rely on data and advances in technology to address the emerging threats to our communities.

Forecasting: When it comes to forecasting, we have made major strides over the years but continued improvements are necessary. Forecasting hurricane intensity is a major contributor to accurately predicting storm surge and the improvement in hurricane forecasting accuracy means fewer unnecessary evacuations, which saves lives and allows us to focus assets where they are most needed.

There has been modest improvement in this area over the past 20 years and only recently has shown some improvement due to the efforts made by the Hurricane Forecast Improvement Project (HFIP). However, the HFIP budget was cut by more than half in 2015. Improvements to forecasts depend on how fast research can be made useful to forecasters who analyze this information and push data and information essential to public communication and informed decision making by emergency responders. This budget (Joint Hurricane Testbed) has also been cut in half.

There is no doubt that weather modeling had reduced forecast errors and expanded forecast capabilities, but we need to continue this work. The potential for massive loss of life due to storm surge persists and provides a call to action for the nation's hurricane research and operations program to develop and implement new storm surge mitigation strategies.

Acquiring and retaining IT staff and the infrastructure needed to develop new products or make forecast more user friendly to emergency managers and the public is essential to continue making advances in information gathering and dissemination. Weather modeling needs to be on par with European agencies. This will help with lead times for emergency managers and the public 4-5 days versus the 48 hours they are given now (or even less in some cases).

Mapping: It is important to have quality maps coming from a detailed study with a desire to consistently provide better data, more detail, and enhanced information. FEMA risk maps must be updated more frequently so critical stakeholders can make decisions about land use, shelter locations, and evacuation routes and to smooth out insurance premium rate increases.

Access to the best data would allow communities to determine the highest risk areas and help them to mitigate the best way possible. It is important to note, especially as the President's

skinny budget proposes changes to funding FEMA's RiskMAP, that while mapping is done in part to support the NFIP, maps are used for many other purposes. FEMA (with engagement of NOAA and USGS and stakeholders) should look at how such maps are being used and identify opportunities to enhance mapping to meet multiple needs.

In addition to improving currently existing federal efforts, FEMA and others should recognize outstanding efforts done by state and local entities and encourage their adoption nationwide. Following Hurricane Floyd in 1999, North Carolina established and has funded a statewide Floodplain Mapping Program. This program, recognized by FEMA as a Cooperating Technical Partner, has to date:

- Acquired two rounds of statewide LiDAR derived topographic data;
- Studied over 31,000 stream and coastal miles with Base Flood Elevations established or updated for all studied streams;
- Facilitated the adoption of the maps by all 100 counties in North Carolina and the Eastern Band of the Cherokee Indian Nation;
- Transitioned completely away from costly cartographic mapping to an efficient, dynamic database derived display for all data and maps;
- Assessed flood damage impacts for all structures in North Carolina for five flood events;
- Established ability to calculate and provide flood insurance premium rates for all structures in North Carolina;
- Established a real-time flood warning system that calculates real-time data to structures; and,
- Established Flood Risk Information System (FRIS) that houses and dynamically displays all flood data, models, maps and risk associated with flood. This system also houses and displays data for Virginia, Alabama and Florida which is highly efficient and a cost savings for each state.

Modeling: Modeling and communicating the total water hazard is a challenge and an opportunity. Modeling the impact of storm surge on rivers, combined with the streamflow and water runoff from rain is extremely difficult and often requires additional high-resolution data to accurately predict an area susceptible to inundation.

Inundation modeling along rivers is very sparse nationwide, and the availability of water-related forecast products are far more advanced over the eastern half of the country versus the West Coast. This results in a degradation of service for western residents and needs to be addressed with a level of standardization that comes from personnel and other developmental resources.

The Role of Mitigation in Reducing Threats and Hazards

When discussing any natural disaster, it is hard to argue against taking action before the catastrophe occurs, rather than waiting until costly damage has affected homes, businesses, and critical infrastructure. Over the years, Congress has authorized and appropriated significant financial and technical assistance to state and local government to pre-empt damages and distress resulting from a natural disaster such as flood, hurricane, tornado, or blizzard.

Mitigation activities can take many forms and the use of mitigation programs often differ by region. What does not differ, however, is the return on investment of these programs. There have

been numerous studies over the years that show mitigation saving four dollars for every one dollar spent. These averages are conservative and many projects achieve much higher return on investment. FEMA's mitigation programs have been effective in reducing the property damage, personal and commercial hardship, as well as long-lasting monetary burdens after a disaster.

Unfortunately, funding decisions at the federal level do not match with goals of proactively addressing risk. From 2004-2013, FEMA spent \$71.2 billion in Public Assistance and Individual Assistance to help communities recover from disasters, in addition to tens of billions of dollars spent by the Departments of Housing and Urban Development and Labor, the Federal Highway Administration, the Federal Transit Authority, the Small Business Administration, and the Army Corps of Engineers. In that same time period, only \$5.2 billion was spent on Hazard Mitigation Grants (post-disaster) and another \$800 million on Pre-Disaster Mitigation (PDM) to reduce the impact of future events. There can be no doubt that mitigation spending pales in comparison to money spent to clean up once the damage is done.

Mitigation activities should not be accomplished solely with federal funding. The goal is to reduce vulnerabilities and increase resilience for the future using all available resources and these efforts can be more sustainable when coupled with investments from state, local, and tribal government as well as private sector and individual stakeholders. Collaborative mitigation strategies encourage relationship building and facilitate innovative funding mechanisms that can support the type of long-term, community-driven investments that risk reduction efforts require. The efforts by the inter-agency Mitigation Framework Leadership Group (MiTFLG) to identify a disaster resilience investment strategy and the congressionally established National Institute of Building Sciences to develop holistic approaches to hazard mitigation incentivization are important initiatives in this realm.

Hazard mitigation is a demonstrably cost-effective effort with a documented return on investment. Providing incentives and empowering communities, business owners, and government officials at all levels to mitigate is a compelling narrative that shifts the focus from federal to community priorities that reflect evolving risk on the ground.

In order to encourage investment and promote the goals of mitigation activities on the state and local level, specific recommendations should be considered.

- *Better Coordination Between Federal Agencies with Roles in Mitigation*
No single agency or level of government, sector of business, or individual community can achieve successful mitigation on its own. While a few professional disciplines identify hazard mitigation as a core mission area, the activities of these disciplines alone are not nearly enough to achieve effective investments and policies that protect against the hazards that lead to future disasters. One potential opportunity for a reinvention and reinvigoration of mitigation in built infrastructure could be in the President's much discussed infrastructure plan. If this plan is pursued, I strongly urge the Administration and Congress to incorporate principals of mitigation and resilience to ensure these investments can withstand extreme weather and support prepared communities as they weather disasters.

- *Connect Mitigation to Other Programs*
Mitigation objectives for specific projects can differ among individuals, but if the same project supports multiple desired outcomes, success and achievement are increased. Opportunities where a mitigation action actually produces more important non-disaster related benefits should also be sought.
- *Rethink Federal Grant Structure*
The current mitigation structure is centered on the federal government and is traditionally reactive, not proactive. Is this the way we want it to be? The federal government does not have to be convinced that mitigation is effective because it reduces the obligations of the federal government but has, over time, shown an unwillingness to invest anywhere close to as much in pre-disaster mitigation as it does in response and recovery costs after a disaster. States understand this, and try very hard to promote mitigation but lack the dollars to incentivize meaningful mitigation adoption on a scale that moves the needle on large-scale risk reduction. The funding that comes from the federal government must *supplement* not *supplant* the work already being done at the state and local level but federal funding is a critical incentive and catalyst for action on a mutually beneficial risk reduction strategy.

Working with the National Weather Service

As you know, the National Weather Service (NWS)—an agency within NOAA—plays a crucial role in providing weather forecasts and warning for the United States. As defined in its strategic plan, NWS is working towards a “Weather-Ready Nation.” This vision has led to a number of initiatives such as developing specific practical pilot projects like mobile Emergency Response Specialists being embedded in Emergency Operations Center and in the field with first responders before, during, and after natural disasters. These initiatives have helped protect lives by informing people with better information so that they can make more knowledgeable decisions. This outlook ties in with that of the emergency management community.

The NWS works hand-in-hand with the emergency management community. In fact, a few years ago, the NWS released a study on their operations and structure. As part of the review, the National Academy of Public Administration and a study team conducted interviews with a range of internal and external stakeholders, including NEMA members and congressional staff. The commitment to work with the emergency management community helps ensure that disaster alert messages are disseminated and that the Nation is in an appropriate readiness posture. The importance of the National Weather Service’s field offices cannot be understated. Offices like the National Hurricane Center (NHC), the Storm Prediction Center (SPC), and many others provide critical data to the states, who then use the information to inform their decisions and public messaging to help protect and save lives.

The NWS has seen great success in its forecasting and warning efforts for some hazards, such as hurricanes. There has been a significant reduction in weather-related deaths as a result of improved warnings. Not only have advancements in notification and warning systems saved lives, but they have also reduced the negative weather-related economic impact to communities.

In Florida, we deal with the six NWS offices that serve the state, and we also house the National Hurricane Center on the grounds of Florida International University. Our emergency managers at the state and local level are on a first-name basis with those local forecasters, and engage with them on a daily basis. During a tropical cyclone event in the state, we host twice-daily conference calls between the state, all of the counties, the NHC, and the impacted forecast offices to ensure that governmental officials responsible for decision-making are able to hear the latest information directly from those who are producing it. It is one of our most fundamental and important relationships, and it provides the foundation necessary for us to protect the lives and property of our citizens.

Engaging the Private Sector

The private sector obviously plays an important role in providing weather forecasts and alerts. A number of private weather companies exist, and in many cases they provide excellent services. These companies utilize National Weather Service information to meet the specific and diverse needs of their clientele. This could include helping farmers manage their crops, ensuring that retailers get the right merchandise mix to their stores on time, assessing the impact of an event so that electrical providers get power restoration crews on the scene as quickly as possible, or providing graphics and detailed local forecasts to radio and television stations and newspapers so the American public is aware of emerging conditions. This is a completely appropriate and symbiotic relationship between government and the private sector that meets the needs of everyone involved.

Academia also plays an important part in this process, training the meteorologist, climatologists, and other scientists necessary to do all of this work. They are also the developers of and home to many of the models that serve as the engine to this work. Continued attention must be paid to this resource to ensure that it continues to provide the work force necessary to accomplish our ambitious agenda.

Conclusion

Water-related threats and hazards will continue to be significant drivers for action at the state and local level. Emergency managers, community leaders, private sector stakeholders, and individuals must be equipped with data and empowered by incentives to achieve goals of preparedness and resilience. As technology evolves and successful coalitions emerge, governments must remain flexible and agile. The federal government can be a catalyst for action at all levels and their investments are critical for sustained and significant investments in the future. We must prioritize informed action with the support of high quality, quantifiable data before disaster occurs if we are to break the cycle of increasing disaster spending following an event.

I thank you for the opportunity to testify today and welcome any questions you may have.