Statement of

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To the

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The National Flood Insurance Program

Members of the Committee. It is a distinct privilege to participate in this important and most timely hearing and I want to thank the Committee for the opportunity.

I am Gerald E. Galloway, Glenn L. Martin Institute Professor of Engineering at the University of Maryland where I teach and do research in water resources and public policy. I served as the co-PI of the of a study of the adequacy of the 1% standard for the National Flood Insurance Program (NFIP) conducted for FEMA by the Water Policy Collaborative at the University of Maryland, and as chairman of the Federal Interagency Levee Policy Review Committee, which recently submitted a report to FEMA on levee issues within the NFIP.

Recommendations

I am here today to urge the committee to:

- Support the continuation of the flood map modernization program being conducted by FEMA and its local partners under the National Flood Insurance Program (and as proposed by S. 1938), and the movement of national mapping from flood insurance rating to the mapping of risk in flood hazard areas.

- Extend the zone for mandatory purchase of flood insurance under the NFIP from the 100 year (1% annual chance) flood zone to the 500 year (0.2% annual chance) flood zone.

- Extend the zone for mandatory purchase of flood insurance to include areas behind levees subject to a residual risk of flooding.

The NFIP

The NFIP is a key component of the nation's flood damage reduction program. It provides a significant federal incentive for communities in or with part of the community in the floodplain to assume responsibility for wise use of those areas. An effectively managed NFIP, supported by lender compliance, effective communications, and appropriate incentives for participating communities, makes a difference in the reduction of flood damages across the nation. Reforms in the program dating back to 1994 are continuously improving its efficiency.

Across the nation there are millions of structures at risk to flooding. Some are in the floodplain or along the coast and have little direct flood protection. Others are behind levees or other structures and subject to the residual risk of levee or structure failure or overtopping. When a major flood occurs and significant property damage occurs, history has shown that the federal government has been there to cover the exposure. When properties have been insured under the NFIP, the costs to the government are reduced by the premiums paid by the insured over time. It is essential that flood hazard areas be identified and that those at risk in these hazard areas share in the responsibility for and funding of post-disaster mitigation through participation in the NFIP.

Extension of Mandatory Flood Insurance to the 500 Year Floodplain

The current standard for mandatory insurance under the NFIP is the 100 year floodplain (1% annual chance floodplain). There is a 26% chance that a 100 year or larger flood will occur within the lifetime of a 30 year mortgage on a property in that floodplain. If the information about the floodplain is sketchy, the odds can rise even more.

As we indicated to FEMA in the report on the adequacy of the1% standard[3]:

> Requiring insurance to the 1 percent standard does not provide for coverage for the significant amount of property at risk in the floodplain between the 1 percent line and the 0.2 percent line. Purchase of flood insurance should be mandatory for those living in the 0.2 percent floodplain if they hold a federally insured mortgage or if they are to receive any disaster assistance from the federal government in the case of a flood. The cost of this insurance should be determined actuarially, based on the reduced risk of living at a specific elevation within the 0.2 percent floodplain.

Our report noted that, in areas where detailed flood studies have been completed, there are estimated to be 2-4 million structures in the 100 to 500 floodplain. In areas where only approximate studies have been completed, estimates indicate that there are 1.5 to 3 million structures in the 100-500 year floodplain. Taken together, the total could be 3-7 million structures at risk. Requiring actuarially based insurance for those in this zone would not impose a significant financial burden on property owners as the risk in this latter zone is considerably less, but would greatly reduce the exposure of residents and of the federal government to losses from a significant event. For an individual family, a single flood can ruin a college savings plan, plans for retirement, or deplete lifetime savings. Many people in the New Orleans area did not have flood insurance, and one can only speculate that the recovery would be further along today if, rather than waiting on some other special program, they had had the benefit of a faster payout of flood insurance. In short, the 100-year (1%) standard is an inadequate guide for the imposition of mandatory insurance in the floodplain and falls short of what we routinely expect for other hazards most notably fire.

Extension of Mandatory Flood Insurance to Those behind Levees

FEMA currently accredits levees with a 100-year protection as sufficient to remove the area protected by the levee from the requirements for mandatory purchase of flood insurance and imposition of land use regulations. This is too low a standard for areas where large numbers of people and/or high value property are at risk. Both the study on the adequacy of the 1% standard and the report of the Interagency Levee Policy Review Committee[4] recommended that levees protecting urban areas be accredited at the 500 year level. These recommendations follow the recommendations of earlier studies dating back as far as 1982 and internal recommendations of the US Army Corps of Engineers

(USACE) and FEMA from that same period. The Association of State Floodplain Managers (ASFPM) and the National Association of Storm and Floodwater Management Agencies (NAFSMA) also support this recommendation.[5]

As we learned in New Orleans and in earlier significant floods, structures do fail. Many of the structures we now have protecting millions of Americans are of unknown or marginal integrity. A major flood in California's Central Valley could overtop the levees in Sacramento and subject the capital of California to billions of dollars in damages. Efforts are already underway to improve protection for California and other areas. There will always be a residual risk of failure or overtopping of levees and other structures. Unfortunately, many people who live behind these levees and structures see them as absolute protection, when in reality, should a significant flood event occur, they would be subject to inundation, property damage and, conceivably, loss of life. Requiring those behind levees to obtain flood insurance informs them of their risk, reduces the impact on these individuals should a such a flood occur, and limits the exposure of the federal and state government in terms of the assistance and indemnification they must provide.

Mapping the Floodplain

This leads me to my third point, the importance of floodplain mapping. The key to effectively dealing with a flood hazard is to know where it is, what the consequences of a flood event might be, and the risks associated with such an event.

The FEMA Map Modernization Program has been a major step forward and has been long in coming. It is difficult for federal, state, and local governments to effectively manage the floodplain if they do not know accurately where it is. I should note that the title should not be map modernization but map modernization and maintenance, for the work of a floodplain mapper is never complete. The federal government may well be able to provide a community a new digital map, but that map starts going out of date the minute it arrives. The local community, with support from federal and state governments, must ensure that it remains up-to-date.

Prior to the institution of the map modernization program, communities were forced to deal with inaccurate mapping of the floodplain and with limited updates in a program that was tied to the tedious and time consuming process of producing paper maps. Establishing a digital environment offers the nation access to maps that can be rapidly updated and easily produced. New techniques in mapping offer the opportunity for increased accuracy.

In carrying out the map modernization program within the funds available, FEMA has taken several approaches in preparing its digital products:

- When available, it has taken advantage of updated topographic, hydrologic, and hydraulic data to better define the floodplain.

- In the case where the map included a levee, it has paused to examine the information that was available about the levee to determine if its accreditation of the levee should be continued. In carrying out this work, FEMA has determined that many levees are of marginal integrity or lack information on how their original entry in the program was justified.

- In some cases it has digitized an existing paper map with little change in the information contained therein.

The accuracy and the utility of a flood map totally depend on:

- The quality of the topographic information used as the base for the map. Where topographic information has been gathered digitally, its utility depends on its resolution. In very flat areas, where a few feet in elevation make a tremendous difference in the extent of the floodplain, high-resolution data is critical but not always available. New techniques such as LIDAR (Light Detection and Ranging) make the gathering of such data more feasible but also more costly.

- The quality (age and accuracy) of the hydrologic and hydraulic data about the area and its watershed.

- The quality and currency of the models that transform base data into flood elevation information and ultimately create maps.

- The availability of information concerning flood damage reduction structures that result in hazard areas being removed from the NFIP regulatory requirements.

Much of the nation's hydrology and hydraulics information is out of date. As the Levee Policy Committee noted:

> The determination of the height of the1-percent-annual-chance flood requires extensive H&H computations and reliance on baseline H&H data concerning the area under study. Approximately 45 percent of levee designs and flood risk determinations are based on precipitation frequency estimates that are as much as 45 years old. Approximately the same percentage of designs and determinations are based on flow frequency guidelines that are at least 25 years old. Many communities lack long-term streamflow records.

Maps will not be accurate if they are not based on sound data. Support of map modernization must also address the needs of NOAA and USGS for funding of needed data collection and monitoring.

In addition, even where current H&H information is available, the challenge becomes the consideration of what changes may occur in the future. Changes in hydrology brought

about by climate change or variability can increase the flow in rivers and raise the flood level. Sea level rise and upstream development that increase runoff do the same thing. The reports of the 1% study and the Levee Policy Review Committee indicate that future conditions should be taken into account in the production of new digital maps. Another report of the NFIP evaluation program, *Managing Future Development Conditions in the National Flood Insurance Program,* points out the monetary savings that can accrue from mapping possible future conditions in a watershed.[6]

It is interesting to note, that the USACE, in its work on the post-Katrina restoration of New Orleans levees to the 100-year protection level is taking into consideration sea level rise and future subsidence in the design of the levees that are being built.

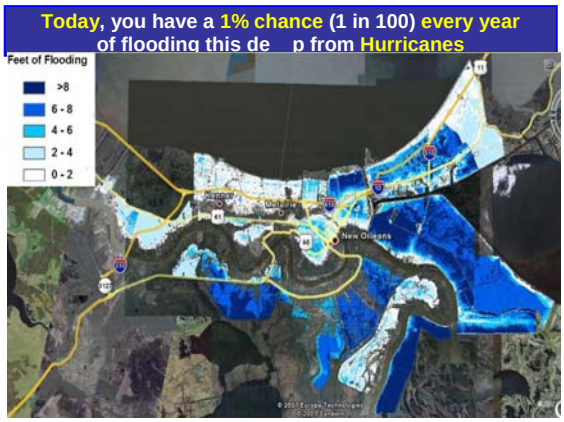
Identifying Risk vs. Hazard

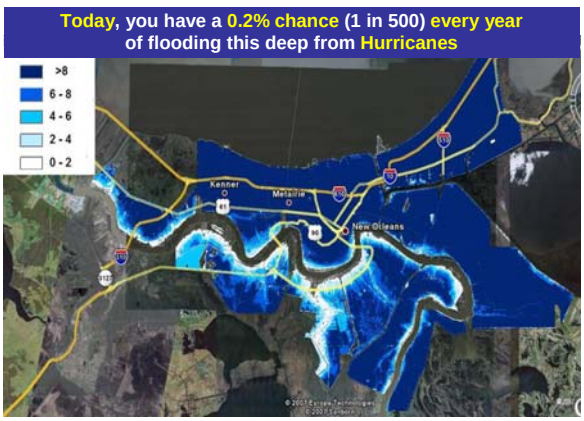
When all of these factors are taken into account, topography, H&H, structures, and future conditions, a sound and effective flood rate map will be produced. However, it maps only one (100-year) or two (100-year and 500-year) elevations on a continuum of flood elevations. FEMA defines flood maps as a series of flood insurance rate maps providing floodplain delineations. CFR 59.1 indicates that a flood insurance rate map (FIRM) is an "official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community."

A flood insurance rate map is not a risk map. It does not identify the relative risk or specific information about the flood hazard. It does not identify the consequences of flooding in the mapped zone. People, who live behind a levee in a floodplain that would be subject to 10 to 20 feet of inundation, see the same thing on a current flood insurance rate map as those who live with only their foundations at risk. Those living behind a levee whose condition is questionable receive no information about the probability that the levee will not perform as intended.

USACE defines risk, in the simplest of terms, as the likelihood of loss of life or property as a result of flooding. Risk analysis incorporates information about the hazard itself, the system (levees, floodwalls, floodways, dams, etc.) associated with the mapped areas and the probability that the system may not perform as designed, and the consequences that will occur should the flood exceed the level of protection provided or should the system fail.

Describing risk on a map is not a simple process, but one that must be accomplished if the public is to know and understand the challenge that it faces living in a flood hazard zone. USACE, in coordination with FEMA, has been working diligently in the New Orleans area to develop various types of flood risk maps and recently published maps that indicated that depths of inundation in various areas in New Orleans should certain floods occur. These maps take into account the performance of the protection system, allowing for the probabilities of overtopping or failures. Two such maps are shown below:





USACE has also developed maps that indicate the consequences of flooding under various scenarios-not just a 1% flood. These maps and others can be found at http://nolarisk.usace.army.mil. This is pioneering work and USACE, FEMA and their federal partners are to be complimented for these efforts.

In its report to FEMA, the Levee Policy Review Committee, recommended the institution of a risk designation for levees that would be based not only on the evaluation of levee or system integrity but also on the potential depth of flooding in the event of failure or overtopping, the type and density of development in areas behind the levee, possible warning times for evacuation and the number and types of egress that would permit those at risk to evacuate the area. The committee proposed that this levee risk classification be designated on the Flood Insurance Rate Map (FIRM) and in the Flood Insurance Study (FIS) report.

It is clear from the language of S. 1938 that the Congress is interested in seeing more than maps that depict only the 100 year flood and that provide no indication of risk. The proposed legislation indicates that risk must be considered in the mapping process. If this is to take place, then a new initiative must be launched as part of the national effort to reduce flood losses through effective mapping.

FEMA and USACE have worked closely on the mapping of New Orleans and are now working together in California's Central Valley. They have also become partners in the development of a national levee inventory. This cooperation has brought the resources of both organizations and those of NOAA and the USGS together to deal with challenging problems in data gathering, elimination of program overlaps, and development of new techniques. This cooperation needs to be extended into the development of flood risk maps for the nation.

It is important that the Congress has recognized the necessity for this move forward and support the coordinated efforts of all participating agencies to improve the provision of risk information to the public.

Before leaving risk, I would like to comment on a disturbing series of events. In the preparation of new flood maps, FEMA has determined that it should place a cautionary

note on maps containing levees in order to alert those behind the levees of the possible risks they must face. There was a clear perception by many in New Orleans prior to the hurricane that they were living behind levees and therefore did not face any risk. The proposed FEMA note that would be placed on new maps indicates:

> WARNING! This area is shown as being protected from the 1-percent-annual-chance flood hazard by levee, dike, or other structure. Overtopping of failure of this structure is possible, which could result in destructive flood elevations and high-velocity floodwaters. There is a chance that large floods will occur that are greater than the level of protection provided by the levee. Communities should issue evacuation plans and encourage property owners behind these structures to purchase flood insurance, even if the structure is currently shown as providing protection for the 1-percent-annual-chance flood.

I understand that some members of the House of Representatives are concerned that such a note overstates the risk and should be modified or eliminated. While I have great faith in the integrity of many levees in this country, I cannot say that the possibility of failure does not exist with the same levees. We learn every day of new challenges to the systems. Informing those behind levees of their situation should not create economic chaos or cause people to want to leave an area where they have long lived. The knowledge of the possible challenge simply allows them to make informed decisions and to prepare for a possible, conceivably very rare, event. I would suggest that the people at risk should have the information and make their own decisions as to what to do with the information.

National Technical Mapping Council

S. 1938 also calls for the reestablishment of the National Technical Mapping Council and I strongly support that measure. While FEMA and USACE have strong professional and technical competencies, both agencies would benefit from the advice of professionals in the mapping field. Both agencies already have extended outreach to technical expertise, but the establishment of the Council will facilitate continuous exchange between all parties.

In Summary

FEMA is to be complimented for its efforts to continuously improve the quality of the flood insurance rate maps it is now producing under the Map Modernization Program. It has recently chartered the National Research Council of the National Academies to conduct a study, *FEMA Flood Maps: Accuracy Assessment and Cost-Effective Improvements*, that will examine approaches reducing the cost and improving the accuracy of flood mapping. I urge the continued support of the Mp Modernization Program.

USACE's efforts, stemming from the work of the Interagency Performance Evaluation Task Force examining the causes of New Orleans flooding, have developed new techniques and procedures that will guide risk identification in the decades ahead. These efforts have received considerable attention from and the support of the professional community. I also urge the Congress to continue support of these programs.

In closing, let me compliment the committee for its attention to the issues of floodplain management and the NFIP in general, and floodplain mapping in particular. The proposed legislation on floodplain mapping provides strong support for continuation of a program that is critical to our efforts to reduce national flood losses and to protect the health and safety of our citizens.

Thank you again for the opportunity to be here today.

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[2] The Water Policy Collaborative is a gathering of scholars and practitioners brought together virtually to address national and international water resources policy challenges and to support other activities to improve the quality of decision making on critical water resource issues. Its membership includes a wide variety of disciplines and individuals located at organizations across the United States. It is hosted and sponsored by the A. James Clark School of Engineering, the School of Public Policy and the College of Behavioral and Social Sciences, University of Maryland. It may be contacted at 1173 Glenn L. Martin Hall, College Park, MD 20742.

[3] *Assessing the Adequacy of the National Flood Insurance Program's 1 Percent Flood Standard.* Galloway, Baecher, Plasencia, Coulton, Louthain, Bagha, and Levy, Water Policy Collaborative, University of Maryland. Available at http://www.fema.gov/business/nfip/nfipeval.shtm.

[4] *The National Levee Challenge: Levees and the FEMA Flood Map Modernization Initiative*. Report of the Interagency Levee Policy Review Committee. Washington, DC. September 2006. Available at http://www.fema.gov/plan/prevent/fhm/lv_intro.shtm.

[5] Joint Recommendations on Levee Policy Developed by ASFPM and NAFSMA from Discussions at the Flood Risk Policy Summit of December, 2007. ASFPM/NAFSMA, May 2007.

[6] *Managing Future Development Conditions in the National Flood Insurance Program.* Blais, Nguyen, Tate, Dogan, and Petrow, ABSG Consulting; and Mifflin and Jones. Available at http://www.fema.gov/business/nfip/nfipeval.shtm.