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FLOOD MAP MODERNIZATION

Federal Emergency Management Agency's Implementation of a National Strategy

Statement of William O. Jenkins, Jr., Director
Homeland Security and Justice Issues

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Highlights

Highlights of GAO-05-894T, a report to Subcommittee on Housing and Community Opportunity, Committee on Financial Services, House of Representatives

Why GAO Did This Study

Floods inflict more damage and economic losses upon the United States than any other natural disaster. During the 10 years from fiscal year 1992 through fiscal year 2001, flooding resulted in approximately $55 billion in damages. The Federal Emergency Management Agency (FEMA) is responsible for managing the National Flood Insurance Program (NFIP). The program uses flood maps to identify the areas at greatest risk of flooding and make insurance available to property owners to protect themselves from flood losses. According to FEMA, many of the nation's flood maps are more than 10 years old and no longer reflect current flood hazard risks because of erosion and changes in drainage patterns. Moreover, because many flood maps were created or last updated, there have been improvements in the techniques for assessing and displaying flood risks.

This testimony is based on GAO's findings and recommendations in its March 2004 report related to (1) how map modernization intended to improve the accuracy and accessibility of the nation's flood maps, (2) what the expected benefits of more accurate and accessible flood maps are, and (3) to what extent FEMA's strategy for managing the map modernization program support the achievement of these benefits.

www.gao.gov/cgi-bin/getrpt?GAO-05-894T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact William O. Jenkins, Jr. at (202) 512-8757 or jenkinswo@gao.gov..

What GAO Found

Through map modernization, FEMA intends to produce more accurate and accessible flood maps by using advanced technology to gather accurate data and make the flood maps available on the Internet. For example, displaying map data in digital Geographic Information Systems format permits consistent, accurate display, and ready electronic retrieval of a variety of map features, including elevation data and the location of key infrastructure, such as utilities.

FEMA expects that by producing more accurate and accessible digital flood maps through map modernization, the nation will benefit in three ways. First, communities can use more accurate digital maps to reduce flood risk within floodplains by more effectively regulating development through zoning and building standards. Second, accurate digital maps available on the Internet will facilitate the identification of property owners who are statutorily required to obtain or who would be best served by obtaining flood insurance. Third, accurate and precise data will help national, state, and local officials to accurately locate infrastructure and transportation systems (e.g., power plants, sewage treatment plants, railroads, bridges, and ports) to help mitigate and manage risk for multiple hazards, both natural and man-made.

At the time of GAO's review, FEMA had not yet established clear standards for the types, quantity, and specificity of data collection and analysis associated with different levels of flood risk. We recommended that FEMA develop standards to better ensure that data collection and analysis is consistent for all communities with similar risk and that it is using its resources efficiently while producing maps that are accurate and useful for communities at different levels of flood risk. In November 2004, FEMA issued its Multi-Year Flood Hazard Identification Plan. The plan describes FEMA's strategy for addressing GAO's recommendation by using varying types of data collection and analysis techniques to develop flood hazard data in order to relate the level of study and level of risk for each county.
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GAO concluded that FEMA's performance measures would not effectively measure the extent to which the agency's map modernization program would result in its primary intended benefits. As a result, GAO recommended that FEMA develop and implement useful performance measures. In response to GAO's recommendation, FEMA has set target percentages in its Multi-Year Flood Hazard Identification Plan for four key performance indicators in fiscal years 2006 through 2009. FEMA's four indicators are (1) Population with Digital GIS Flood Data Available Online, (2) Population with Adopted Maps that Meet Quality Standards, (3) Percent of Effort Leveraged; that is, state and local resources provided for map modernization as a percentage of FEMA resources provided, and (4) Appropriated Funds Sent to Coordinating Technical Partners.

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to participate in today's hearing to discuss the Federal Emergency Management Agency's (FEMA) national flood map modernization program.[1] My testimony is primarily based on our March 2004 report on FEMA's map modernization efforts.[2]

Floods inflict more damage and economic losses upon the United States than any other natural disaster. During the 10 years from fiscal year 1992 through fiscal year 2001, flooding caused over 900 deaths and resulted in approximately $55 billion in damages.[3] Since its inception 36 years ago, the National Flood Insurance Program (NFIP) has combined the development of flood maps to identify the areas at greatest risk of flooding with mitigation[4] efforts to reduce or eliminate flood risks to people and property and the availability of insurance that property owners can purchase to protect themselves from flood losses. The flood insurance program has paid about $12 billion in insurance claims, primarily from policyholder premiums, that otherwise would have been paid, at least in part, from taxpayer-funded disaster relief.

Accurate flood maps that identify the areas at greatest risk of flooding are the foundation of the NFIP. The maps are principally used by (1) the approximately 20,000 communities participating in the NFIP to adopt and enforce the program's minimum building standards for new construction within the maps' identified floodplains, (2) FEMA to

[1]Prior to March 2003, FEMA was an independent agency whose Federal Insurance and Mitigation Administration was responsible for managing the flood insurance program. The Homeland Security Act of 2002, P.L. 107-296 (Nov. 25, 2002), transferred FEMA and all its responsibilities to the Emergency Preparedness and Response Directorate within the new Department of Homeland Security. This transfer was effective March 1, 2003. Currently, the Mitigation Division within FEMA is responsible for the flood insurance program, including flood map modernization.

[2] GAO, *Flood Map Modernization: Program Strategy Shows Promise, but Challenges Remain*, GAO-04-417, (Washington, D.C.: March 31, 2004)

[3]Data are from the U.S. Army Corps of Engineers in cooperation with the National Weather Service.

[4] Mitigation is defined by the Federal Emergency Management Agency as sustained action that reduces or eliminates long-term risk to people and property from hazards and their effects.

develop accurate flood insurance policy rates based on flood risk, and (3) federally regulated mortgage lenders to identify those property owners who are statutorily required to purchase federal flood insurance. Under the National Flood Insurance Act of 1968, as amended,[5] property owners whose properties are within the designated floodplain and have a mortgage from a federally regulated financial institution are required to purchase federal flood insurance.

Flood maps can become outdated for a variety of reasons, such as erosion or community growth and development that can affect the drainage patterns of rainwater. Thus, flood maps must be periodically updated to assess and map changes in the boundaries of floodplains that result from community growth, development, erosion, and other factors that affect the boundaries of areas at risk for flooding.

With congressional support and funding, last year FEMA embarked on a $1 billion, 5-year effort to update the nation's flood maps. Today, I am here to discuss the findings and recommendations of our March 2004 report. My remarks today will focus on (1) how map modernization is intended to improve the accuracy and accessibility of the nation's flood maps; (2) what the expected benefits of more accurate and accessible flood maps are; and (3) to what extent FEMA's strategy for managing the map modernization program supports the achievement of these benefits.

To answer these questions, we analyzed available information from FEMA on the program's purpose, objectives, and status and met with agency officials in headquarters and in the regional offices to discuss the program's progress. We also conducted site visits to states and communities that have already begun to modernize their flood maps and interviewed industry organizations such as the Association of State Flood Plain Managers, the National Association of Flood and Stormwater Management Agencies, and the National Emergency Management Association. We conducted our work from April 2003 to March 2004 in accordance with generally accepted government auditing standards.

[5] See 42 U.S.C. 4001 et seq.

Summary

In summary, we found:

- Through map modernization, FEMA intends to produce more accurate and accessible flood maps by using advanced technology to gather accurate data and make the flood maps, and the digital information on which they are based, available on the Internet. For example, displaying map data in digital Geographic Information Systems (GIS) format permits consistent, accurate display, and ready electronic retrieval of a variety of map features, including elevation data and the location of key infrastructure, such as utilities. According to FEMA, nearly 70 percent of the nation's approximately 92,222 flood maps were more than 10 years old at the time of our review. Many of these maps no longer reflect current flood hazard risks because changes such as erosion and development can alter drainage patterns and, thus, the areas at highest risk of flooding. Moreover, since many flood maps were created or last updated, there have been improvements in the techniques for assessing and displaying flood risks.

- FEMA expects that by producing more accurate and accessible digital flood maps through map modernization, the nation will benefit in three ways. First, communities can use more accurate digital maps to reduce flood risk within floodplains by more effectively regulating development through zoning and building standards. Second, accurate digital maps available on the Internet will facilitate the identification of property owners who are statutorily required to obtain or who would be best served by obtaining flood insurance. Third, accurate and precise data will help national, state, and local officials to accurately locate infrastructure and transportation systems (e.g., power plants, sewage treatment plants, railroads, bridges, and ports) to help mitigate and manage risk for multiple hazards, both natural and man-made.

- FEMA's strategy for managing map modernization is designed to support the expected program benefits, but FEMA's approach to implementing the strategy raised several concerns that we concluded could hamper the agency's efforts. FEMA's implementation approach is based on four objectives: (1) establish and maintain a premier data system, (2) expand outreach and better inform the user community, (3) establish and maintain effective partnerships, and (4) achieve effective program management.

    - *Establish and maintain a premier data system:* Although FEMA's efforts to establish a new data system could result in more accurate flood maps and make it easier to access and use the revised flood maps, at the time of our review, FEMA had not yet established clear

standards for the types, quantity, and specificity of data collection and analysis associated with different levels of flood risk. FEMA had ranked the nation's 3,146 counties from highest to lowest flood risk. According to FEMA, communities at the highest risk of flooding require the most extensive, detailed data and analysis, but the same level of data collection and analysis may not be necessary to create accurate, useful maps for communities with lower flood risks. Defining the level of data collection and analysis for different levels of risk are important because obtaining and analyzing flood map data is time-consuming and expensive, and the more detailed and specific the data, generally the greater the effort and costs required to obtain it. By identifying the types, quantity, and specificity of the data and analysis needed for communities based on their risk, we concluded that FEMA could better ensure that data collection and analysis is consistent for all communities with similar risk and that it is using its resources efficiently while producing maps that are accurate and useful for communities at different levels of flood risk. FEMA acknowledged the need to develop such standards, but, at the time of our review, had not yet developed draft standards or included this task into its map modernization implementation plan. In November 2004, FEMA issued its Multi-Year Flood Hazard Identification Plan. The plan describes FEMA's strategy for addressing our concerns and discusses the varying types of data collection and analysis techniques the agency plans to use to develop flood hazard data in order to relate the level of study and level of risk for each county.

- *Expand outreach and better inform the user community*: FEMA's planned expanded outreach efforts are intended to increase public awareness and obtain community acceptance of the updated flood maps because the updated information could potentially identify changes in floodplain boundaries and, therefore, affect property owners, including whether or not their property's location may require them to purchase federal flood insurance. FEMA's intended outcome for these outreach efforts is to reduce community vulnerability to natural and man-made hazards and increase participation in the flood insurance program. Because FEMA does not have the authority to require that affected property owners take steps to protect their properties against flood risks or to ensure that owners whose properties are in the floodplain purchase flood insurance, effective outreach is essential to ultimately achieve these benefits.

- *Establish and maintain effective partnerships*: FEMA's objective for building and maintaining mutually beneficial partnerships is designed to facilitate and support the efficient production and effective use of maps. FEMA recognizes that local, state, and federal agencies that have been working on mapping activities for years, have the resources and potential to positively affect the quality and quantity of the data collected and improve the way these data are used. In addition, these partnerships can enable FEMA to leverage its resources and reduce the federal costs of map modernization. FEMA had developed a strategy for partnering with these agencies to encourage greater involvement in map modernization, including the contribution of resources. However, we concluded that the overall effectiveness of the agency's partnering efforts was uncertain because FEMA had not yet developed a clear strategy for partnering with communities that have few resources, limited mapping capability, and little history of flood mapping activities. FEMA's Multi-Year Flood Hazard Identification Plan (the Plan) does not explicitly address such strategies. For fiscal year 2004, the Plan notes that, nationwide, dollars leveraged from local, non-FEMA sources substantially exceeded the target level of 20 percent, with 36 percent of the effort leveraged from other partners. In 4 of the 10 FEMA regions the leverage exceeded 40 percent. However, in 3 of the 10 FEMA regions the leverage was less than 10 percent. This experience, along with a projected 50 percent increase in the total cost of the program, supports the need for strategies to address disparities and maximize map modernization stakeholders' contributions to the program.

- *Achieve effective program management*: In March 2004, FEMA awarded a performance-based contract to a single contractor to oversee map modernization that includes performance measures to gauge the success of its efforts. Through a staffing analysis, FEMA had determined that it needed 75 staff with specific, identified skills to effectively monitor and manage the contract and overall map modernization program. As of March 2004, FEMA had hired 1 of the 75 staff, and had developed plans to hire or transfer 43 others, but had not yet determined how it would acquire the remaining 31 positions. In addition, we found that FEMA had not clearly defined performance measures related to whether (1) the revised maps meet any established standards for accuracy and (2) outreach efforts are successful in increasing the community and individual awareness and use of flood maps. In response to our recommendation, FEMA's set goals in its November 2004 Multi-Year Flood Hazard Identification Plan for key performance indicators.

FEMA's four indicators are (1) Population with Digital GIS Flood Data Available Online, (2) Population with Adopted Maps that Meet Quality Standards, (3) Percent of Effort Leveraged; that is, state and local resources provided for map modernization as a percentage of FEMA resources provided, and (4) Appropriated Funds Sent to Cooperating Technical Partners (CTP). To track its progress of map modernization annually, FEMA set target percentages for achieving these performance indicators in fiscal years 2006 through 2009.

Map Modernization Intends to Use Advanced Technologies to Produce More Accurate and Accessible Digital Flood Maps:

Through map modernization, FEMA intends to produce more accurate and accessible flood maps by using advanced technology to gather accurate data and make the resulting information available on the Internet. Many of the flood maps in FEMA's inventory do not accurately reflect the true flood hazard risks because over time, new development and other factors altered watersheds and floodplains faster than the maps could be updated. Prior to fiscal year 2004, the $35 million to $50 million in annual flood insurance policy fees had been the only source of funding for updating flood maps, and according to FEMA, the agency had not been able to keep the maps updated with the funds available. As a result, at the time of our review, nearly 70 percent of the nation's approximately 92,222 flood maps[6] were more than 10 years old and many contain inaccurate data, according to FEMA.

Over time, physical conditions in watersheds and floodplains can change, and improvements in the techniques for assessing and displaying flood risks are made. FEMA plans to use the latest technology, such as GIS, to create accurate digital flood maps. GIS technology provides the foundation for achieving FEMA's goals of melding different types and sources of data to create the new digital flood maps and making the new digital flood maps available to a variety of users over the Internet. The primary function of GIS is to link multiple digital databases and graphically display that information as maps with potentially many different types of "layers" of information. When layers of information are formatted using the same standards, users can potentially overlay various layers of information about any number of specific topics to examine how the layers interrelate. Each layer of a GIS map represents a particular "theme" or feature, and one layer could be derived from a data source completely different from the other layers. For example, one theme could

[6] The 92,222 flood maps represent nearly 20,000 communities.

represent all the streets in a specified area. Another theme could correspond to the topography or elevation data of an area, and others could show aerial photography and streams in the same area. These themes are all key elements needed to create flood maps that accurately depict floodplains and can be used to identify properties in these areas. In preparing for full-scale implementation of map modernization, FEMA had established standards and graphic specifications for digital flood maps created with GIS.

GIS technology also enables the creation of more accurate and accessible maps than would be possible with older mapping methods and technology. The majority of FEMA's flood map inventory was produced using manual techniques that have inherent accuracy and accessibility limitations. For example, in creating traditional paper flood maps, field measurements taken by surveyors would have been transferred by hand to paper base maps. If the paper base map contained any inaccuracies, then the field-survey data could be shown in the wrong place on the final flood map. This would then result in floodplain boundaries being shown in the wrong place.

By their nature, paper flood maps have limited accessibility as compared with a digital map that can be made available on the Internet. The expansion of Internet connectivity in recent years has substantially enhanced the potential value of digital maps created with GIS because now it is possible to locate and connect data from many distinct GIS databases to develop analytical information on almost any topic that is associated with physical locations. Digital flood maps created according to FEMA's standards are intended to provide users not only with the ability to determine the flood zone and base flood elevations for a particular location, but also with the ability to access other information like road, stream, and public land survey data. Communities could use this information for a variety of purposes, including decisions on future development and evacuation routes.

As part of map modernization, FEMA has promoted the use of a variety of advanced technologies to improve the accuracy of flood maps. In recent years, for example, where it deems it appropriate, FEMA has promoted the use of Light Detection and Ranging (LIDAR) remote sensing technologies to generate highly detailed, digital elevation data.

Elevation data are a key component needed to determine flood risk and identify floodplain boundaries. According to FEMA, for very flat areas where small changes in elevation can have a large impact on where flood

plain boundaries are drawn, LIDAR can provide the level of detail needed to accurately delineate these boundaries. Communities can also use detailed, digital elevation data for planning and land development purposes.

FEMA Expects Map Modernization to Increase the Likelihood Maps Will Be Used for Risk Management

FEMA expects map modernization to increase the likelihood that the more accurate and accessible maps will be used for risk management purposes. Specifically, FEMA expects the new maps to be used to (1) improve flood mitigation, (2) increase flood insurance participation, and (3) improve "multi-hazard" mitigation and risk management capabilities. First, FEMA expects communities to be able to use these new and revised maps to better manage and mitigate flood risk by regulating floodplain development through building codes, ordinances, and regulations. Second, the new maps also have the potential to help increase flood insurance participation because they will more accurately identify those properties that are in the floodplain and whose owners would be required to purchase flood insurance. Third, the data and infrastructure developed by map modernization is also expected to help national, state, and local officials mitigate and manage risk from multiple hazards, both natural and man-made. Accurate digital maps can provide more precise data on such things as the location of hazardous material facilities, power plants, railroads, and airports to state and national officials for planning development as well as to assess internal weaknesses and evacuation routes.

Map Modernization Is Expected to Improve Flood Mitigation

The more accurate and updated flood hazard information produced through map modernization is expected to help improve flood mitigation in participating communities. The NFIP requires participating communities to adopt and enforce building standards based on the floodplain boundaries and base flood elevations when maps are updated. For example, the lowest floor of structures in new construction must be elevated to at least the base flood elevations identified on the maps. FEMA's policy is to monitor communities to ensure that they have adopted building standards that meet the minimum NFIP criteria and to ensure that they are effectively enforcing these standards. If communities fail to establish and enforce minimum NFIP flood plain building standards, FEMA can suspend availability of federal flood insurance.

Communities also may use updated flood hazard data to take actions to mitigate flooding that go beyond adopting the building standards required by the NFIP. For example, communities may use the data from the maps

to identify where to conduct capital improvement projects designed to mitigate flooding of structures in the floodplain. In addition, FEMA has established a Community Rating System that provides discounts on flood insurance premiums for those communities that take mitigation actions beyond those required by the NFIP.

Map Modernization Is Expected to Help Increase Flood Insurance Participation

Map modernization has the potential to help increase flood insurance participation. The accuracy of the new maps should better identify at-risk property owners who would be best served by obtaining flood insurance whether or not the owners would be required to purchase insurance under the NFIP's mandatory purchase requirement. Moreover, the digital, GIS-based maps should make flood risk information more accessible to a variety of users such as lenders and community officials who could conduct targeted outreach to these property owners.

It is important to note, however, that FEMA, states, and communities do not have the authority to ensure that property owners who are subject to the mandatory purchase of flood insurance requirement actually purchase flood insurance. It is the federally regulated lenders' responsibility to ensure that borrowers purchase flood insurance and that the insurance policy is maintained throughout the loan's life as each new lender servicing the loan becomes aware that the affected property is at risk for flooding. Furthermore, owners of properties without mortgages or properties with mortgages held by unregulated lenders are not required to purchase flood insurance, even if the properties are in floodplains.

Map Modernization Is Expected to Improve Multi-Hazard Mitigation and Risk Management Capabilities

FEMA expects that the data developed, collected, and distributed through map modernization will help national, state, and local emergency managers mitigate and manage risk posed by other natural and man-made hazards. Accurate digital base maps provide more precise data to state and national officials for planning, such as the location of hazardous material facilities, power plants, utility distribution facilities, and other infrastructure (bridges, sewage treatment plants, buildings, and structures). According to FEMA, map modernization will also support DHS's overall goal to reduce the nation's vulnerability to terrorism by providing GIS data and capabilities to other departmental functions. For example, more accurate information on transportation systems such as railroads, airports, harbors, ports, and waterways should be helpful in assessing internal weaknesses and evacuation routes.

FEMA's Strategy for Map Modernization Shows Promise, but Challenges Remain

FEMA's strategy for managing map modernization is intended to support the achievement of the expected program benefits of improved flood mitigation, increased NFIP insurance participation, and improved multi-hazard mitigation and risk management capabilities. However, in reviewing FEMA's approach to implementing the strategy, we identified several challenges that could hamper the agency's efforts. FEMA's approach is based on four objectives. Two objectives FEMA hopes to achieve through map modernization—building and maintaining a premier data collection and delivery system and expanding outreach and better informing the user community—have the potential to improve the use of flood maps for improved flood mitigation and increased NFIP participation, as well as multi-hazard risk management. The other two objectives—building and maintaining mutually beneficial partnerships and achieving effective program management—are intended to facilitate the achievement of the first two objectives and their intended benefits efficiently and effectively.

In Its Efforts to Establish a New Data System, FEMA Had Not Yet Established Data Standards for Different Levels of Risk

The goal of FEMA's objective to develop a new data system using the latest technology is more efficient production, delivery and, thereby, the use of flood maps. As discussed previously, FEMA hopes to accomplish this by using geographic information systems technology that provides the foundation for the production and delivery of more accurate digital flood maps and multi-hazard data that is more accessible over the Internet.

In developing the new data system to update flood maps across the nation, FEMA's intent is to develop and incorporate flood risk data that are of a level of specificity and accuracy commensurate with communities' relative flood risks. According to FEMA, there is a direct relationship between the types, quantity, and detail of the data and analysis used for map development and the costs associated with obtaining and analyzing those data. FEMA believes it needs to strike a balance between the relative flood risk faced by individual communities and the level of analysis and effort needed to develop reliable flood hazard data if it is to update the nation's maps efficiently and effectively.

FEMA ranked all 3,146 counties from highest to lowest based on a number of factors, including, among other things, population, growth trends, housing units, flood insurance policies and claims, repetitive loss properties, and flood disasters. On the basis of this ranking, FEMA established mapping priorities. However, at the time of our review, FEMA had not established standards on the appropriate data and level of analysis required to develop maps based on risk level. FEMA had historically

applied the same minimum standards for all flood maps and supporting data.[7] FEMA's Guidelines and Specifications for Flood Hazard Mapping Partners provided guidance for selecting the level of analysis and effort to produce flood hazard data and the guidelines had generally been used on a case-by-case basis.[8] We found that the guidelines do not specify standards to be used for all mapping projects within a given risk category and concluded that, without establishing standards for different categories of risk, FEMA could not ensure that it uses the same level of data collection and analysis across all communities within the same risk category. These standards could also provide a consistent basis for estimating the costs of developing maps in each risk category. At the time of our review, FEMA had not yet developed draft standards or incorporated this task into its implementation plan. As a result, we recommended that FEMA develop and implement data standards that would enable FEMA, its contractor, and its state and local partners to identify and use consistent data collection and analysis methods for communities with similar risk.

In November 2004, FEMA issued its Multi-Year Flood Hazard Identification Plan. The plan describes FEMA's strategy for updating flood maps used for NFIP purposes and discusses the varying types of data collection and analysis techniques the agency plans to use to develop flood hazard data in order to relate the level of study and level of risk for each county.

FEMA's Objective to Expand Outreach Efforts Recognizes the Agency Must Rely on Others to Achieve Map Modernization Benefits

FEMA's objective to expand the scope and frequency of its outreach efforts is intended to increase community and public acceptance of revised maps and use of those maps. Historically, FEMA has only contacted communities when initiating remapping and again when preliminary maps are completed. These expanded outreach efforts reflect FEMA's understanding that it is dependent on others to achieve the benefits of map modernization. For example, under the structure of the NFIP, FEMA is dependent on communities to adopt and enforce FEMA's minimum building standards and on mortgage lenders to ensure compliance with mandatory flood insurance purchase requirements. To expand the scope of its outreach efforts, FEMA plans to involve a wide variety of community participants—e.g., mayors, emergency managers,

[7]For example, FEMA implemented digital base map standards in 1998 and LIDAR standards in 2000.

[8] These guidelines describe detailed methods of analysis used for high-risk areas and less detailed methods used for low-risk areas.

lenders, property owners, insurance agents, and developers—in the mapping process. To expand the frequency of outreach, FEMA intends to increase community involvement, awareness, and participation throughout the entire flood mapping process. Through a continual education process, FEMA's goal is to inform property owners and others potentially affected by remapping efforts of steps they can take to mitigate the risk of flooding, the types of damage and costs caused by flooding, and the benefits of flood insurance.

According to FEMA, if a community is involved in and understands the map modernization process, the community is more likely to accept and trust the accuracy of the final, revised maps and is more likely to use the maps' hazard data to mitigate natural and man-made disasters. Conversely, if affected property owners do not understand why their communities are being mapped (or remapped) or why their property is now in a flood zone, the unexpected additional expense of new or increased flood insurance premiums can form the basis of significant community opposition to map modernization activities and lead to formal appeals, litigation, and delays in implementing map changes.

FEMA's expanded outreach efforts are intended to educate the public of the potential flood risk in communities and to encourage them to take action. Communities that participate in the NFIP are required to establish floodplain management ordinances that require new and substantially improved structures in newly designated floodplains to meet NFIP building standards. However, if a property was not located in the floodplain in the old map but is in the floodplain in the new revised map, NFIP floodplain management regulations do not require those owners to implement mitigation measures unless they make substantial improvements to the structure.[9] FEMA cannot compel affected property owners to take steps to protect their properties against flood risks or to purchase flood insurance. Under current notification requirements, federally regulated lenders, not FEMA, serve as the primary channel for notifying property owners whose mortgaged properties are subject to flood insurance requirements. When property owners seek new financing, through purchase or refinancing, federally regulated mortgage lenders are required to determine if the property is in the floodplain and, if so, require

[9] If a community determines that the cost of improvements to a home or business equals or exceeds 50 percent of the market value of the building, the building is considered a "substantial improvement" and must meet the NFIP's minimum requirements.

the purchase of flood insurance. Lenders are not required to monitor map changes or to notify property owners with existing mortgages whose properties are identified in a floodplain by remapping if they are not aware of the change in status.[10]

Nonetheless, if federally regulated lenders become aware of flood map changes that affect properties for which they hold mortgages through FEMA notifications or flood zone determination companies,[11] then they must notify the property owner and require the purchase of flood insurance. The information that must be provided to property owners is limited to notifying property owners that their structure is in a floodplain, providing a definition of a flood plain, and requiring the purchase of flood insurance if they live in a participating NFIP community. As a result, FEMA's outreach efforts are important for supplementing the formal requirements for notifying communities and property owners of map changes.

FEMA's Strategy for Partnering with States and Local Communities Does Not Include Communities with Few Resources to Assist in Flood Mapping

FEMA's objective for building and maintaining mutually beneficial partnerships is intended to facilitate and support the efficient production and effective use of flood maps. According to FEMA, local, state, and federal partners that have invested resources and assisted in managing mapping activities have the potential to positively affect the detail, accuracy, and quantity of the data collected and improve how these data are used. As part of their strategy for partnering, FEMA provides guidance to the states on how to develop "business plans" that document planned efforts to develop states' and communities' capability and capacity to oversee the collection, analysis, and implementation of flood data in their state and community and to justify funding for these efforts. According to FEMA, 38 states had begun drafting such plans. FEMA intends to use these state business plans to help prioritize its continuing efforts to develop map modernization partners.

[10] In making loans, federally regulated lenders are required to ensure that property owners purchase flood insurance if their mortgages are secured by a structure located in a floodplain. Lenders are also required to check the flood hazard status of a property when triggered by statutory tripwires, such as loan renewal or extension.

[11] Many lenders use flood zone determination companies to determine whether properties require flood insurance as a result of loan origination, loan assumption, or map changes. These companies use FEMA flood maps and other data to ascertain if properties are situated in flood zones.

Through its CTP program, FEMA has developed partnerships with a variety of states and communities that have developed their own data and provided their own funds to help update local flood maps. Since 2000, FEMA has leveraged millions of dollars in funding from 171 partners (states and local communities) for producing maps through its CTP program. For example, from fiscal years 2000 to 2002, FEMA used $70 million of its federal map modernization funding along with state and local funds to develop what FEMA has estimated to be more than $155 million worth of new mapping data. According to FEMA, partnering has other benefits as well. For example, in the long-term, those states and communities with whom FEMA has established partnerships may be more likely to accept final map changes, expand their capabilities, and assume greater responsibility for periodically developing and incorporating updated flood data, resulting in cost savings to FEMA.

Some states and communities with few resources and technical capacities or little history of flood mapping activities are likely to pose a challenge to FEMA's ability to fund and implement mapping activities. For example, we talked with flood management officials in several smaller communities in Montgomery County, Texas; Santa Cruz County, Arizona; and Larkspur, Colorado. These officials said that their communities lacked either the funding needed to develop flood data, the technological capability to develop digital flood data and use geospatial information systems, or, in some cases, the community support needed to conduct mapping activities. One approach for obtaining additional resources, capabilities, and community support would be for FEMA to facilitate coordination with other agencies within the state that have a stake in, or could benefit from, mapping activities. For example, state departments of transportation can benefit from information in FEMA's geospatial information system, such as elevation data, in planning and building state roads and bridges. North Carolina was able to get its state transportation department to help fund the development of elevation data used for flood maps. At the time of our review, FEMA had not yet developed a strategy for how to partner with communities that do not have the resources, capabilities, or motivation to initiate and sustain mapping activities. Such a strategy could focus on how to assist these potential partners in garnering community resources and developing technological capabilities, how to coordinate with other agencies in their state, and how to integrate these efforts with FEMA's community outreach efforts to gain community support for mapping activities. As a result, we recommended that FEMA develop and implement strategies for partnering with state and local entities with varying levels of capabilities and resources. FEMA's Plan does not explicitly address such strategies. For fiscal year 2004, the Plan notes that,

nationwide, dollars leveraged from local, non-FEMA sources substantially exceeded the target level of 20 percent, with 36 percent of the effort leveraged from other partners. In 4 of the 10 FEMA regions the leverage exceeded 40 percent. However, in 3 of the 10 FEMA regions the leverage was less than 10 percent. This experience, along with a projected 50 percent increase in the total cost of the program, supports the need for strategies to address disparities and maximize map modernization stakeholders' contributions to the program.

Program Management Contract Is Performance-Based, but FEMA May Have Difficulty Overseeing the Contract and Measuring Achievement of Program Objectives:

In March 2004, FEMA awarded a performance-based contract to obtain assistance from a nationwide mapping contractor to manage tasks associated with the significant expansion of the map modernization program. Unlike many traditional government service contracts, which emphasize inputs rather than outcomes, a performance-based contracting approach gives the contractor the flexibility to determine how best to achieve the outcomes and links payment to the contractor's ability to achieve these outcomes—an approach supported by our past work in federal contracting. Overseeing these types of contracts requires agency staff with the knowledge, skills, and abilities to monitor the contractor's efforts using performance measures that accurately measure agreed-upon outcomes.

We concluded that FEMA might be limited in its ability to effectively manage the contract, as well as the significant expansion of tasks associated with a five-fold increase in funding and related mapping activities that will continue to be performed by agency staff. These tasks include managing grants for many new mapping partners and administering contracts with independent firms to develop and process a significantly larger quantity of flood data to support local efforts. A staffing needs assessment completed by FEMA in December 2003 identifies a need for an additional 75 staff with additional skills, including contracting and program management capabilities. In appropriating fiscal year 2004 map modernization funds, Congress included a provision that would allow FEMA to use up to 3 percent, or $6 million, for administrative purposes. As of March 2004, FEMA had filled 1 of the 75 positions by reallocating existing resources. At the time of our review FEMA planned to fill another 33 positions using the administrative funding identified in the fiscal year 2004 budget. In addition, FEMA also planned to fill an additional 10 positions by moving staff from other FEMA departments or filling vacancies. However, at the time of our review, FEMA had not yet established a plan for filling the remaining 31 headquarters and regional positions. As a result, we recommended that FEMA ensure that it has the

staff capacity to effectively implement the nationwide mapping contract and the overall map modernization program.

One element of effective program management is establishing performance measures to determine how well FEMA is achieving its map modernization program objectives. FEMA had established performance measures for all four of its program objectives. However, we concluded that FEMA's measures for two of those objectives that directly support the use of flood maps for risk management—to develop a premier data system and to expand and better inform the user community were not clearly defined or fully developed. FEMA's principal measure for developing and maintaining a premier data collection and delivery system is the percent of the national population with community-adopted, GIS data-based flood maps. However, this measure does not indicate whether the maps themselves meet any FEMA-established standards for accuracy (because FEMA had not yet defined the minimum level of data collection and analysis for communities with similar risk).

To measure the progress and success of expanding and better informing the user community, FEMA established performance measures related to the percent increase in communities' awareness and use of new maps. FEMA plans to use surveys as the primary means of measuring increased community awareness and use of the new maps. However, FEMA had not yet fully developed an operational definition of how it plans to measure "awareness" or "use," for example, that reflect mitigation steps taken or the purchase of flood insurance. Because the link between revising maps and the use of maps in terms of increased NFIP participation is not direct, we recognized that it may be a challenge to develop a performance measure that accurately reflects the impact on NFIP participation rates of efforts to expand and improve outreach. Nonetheless, without developing such a measure (or measures), we concluded that FEMA would be less able to ensure that its map modernization program will have resulted in one of FEMA's primary intended benefits. As a result, we recommended that FEMA develop and implement useful performance measures that define FEMA' s progress in increasing stakeholders' awareness and use of the new maps, including improved mitigation efforts and increased participation rates in purchasing flood insurance.

In response to our recommendation, FEMA's set goals in its November 2004 Multi-year Flood Hazard Identification Plan to improve public safety through the availability of reliable flood risk data. Specifically, FEMA plans to increase the safety for at least 85 percent of the U.S. population through availability of accurate flood risk data in GIS format. To achieve

this goal, FEMA has set targets for key performance indicators (KPI) through fiscal year 2009 (production is scheduled for completion in fiscal year 2010). FEMA's four KPIs are (1) Population with Digital GIS Flood Data Available Online, (2) Population with Adopted Maps that Meet Quality Standards, (3) Percent of Effort Leveraged; that is, state and local resources provided for map modernization as a percentage of FEMA resources provided, and (4) Appropriated Funds Sent to CTPs. To track its progress of map modernization annually, FEMA set target percentages for achieving these performance indicators in fiscal years 2006 through 2009.

Mr. Chairman and Members of the Committee, this concludes my prepared statement. I would be pleased to answer any questions you and the Committee Members may have.

Contact and Staff Acknowledgements

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