Moving to Digital Flood Hazard Information

Issues and Recommendations for

The Limited Distribution of Paper Flood Insurance Rate Maps

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Stakeholder Support - Flood Map Modernization
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"To provide Technical Support to FEMA's Flood Map Modernization initiative"

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Executive Summary

Introduction

The Federal Emergency Management Agency (FEMA) publishes Flood Insurance Rate Maps (FIRMs) that are used for hazard identification, floodplain management, and flood insurance in the National Flood Insurance Program (NFIP). FEMA has been providing flood hazard maps since the 1970s to help manage and reduce risk for the more than 20,000 communities that participate in the NFIP. Historically, FEMA provided flood hazard information through paper Flood Insurance Rate Maps (FIRMs).

In 2003 Congress funded the Flood Map Modernization (Map Mod), which enabled the upgrade of paper FIRMs to the digital geo-spatial platform. FEMA's Digital Vision is the comprehensive approach implemented during Flood Map Modernization to transition from paper to digital products. Map Mod is creating new digital products or converting the National Flood Insurance Program (NFIP) paper map inventory to digital products and moving to digital delivery of these products via the Internet.

Beginning on October 1, 2009, customers may order only digital flood hazard maps and reports. FEMA's Map Service Center (MSC) will not produce or distribute paper Flood Insurance Rate Maps (FIRMs), Flood Hazard Boundary Maps (FHBMs), or Flood Insurance Study (FIS) reports on or after this date, other than a single paper copy provided to communities when their maps are updated[1]. Reasons[2] provided for this change are:

- FEMA expects to save $3.5 million annually
- Digital versions will provide greater utility
- Reducing redundancy between digital and paper products
- Enabling a transition to products that are produced as needed with the most current information

FEMA will discontinue all other distribution of paper maps and study reports beginning with map update projects where the letter of final determination is issued on or after October 1, 2009. The letter of final determination is issued six months before new flood maps become effective for NFIP regulatory purposes. FEMA will continue to provide digital flood hazard data products for Internet download, on CD–ROM, and via Web Mapping Service. Federal, State, and local government customers that have been receiving paper products will now receive digital flood hazard maps and data, and continue to be exempt from fees (specified in 42 U.S.C. 4101)[3].

Objectives

The objective of this report is to (1) provide FEMA with a list of impediments or adverse impacts of limited paper map distribution, (2) present the current status of stakeholder understanding

[1] Moving to Digital Fact Sheet – *Attachment 1* or http://www.fema.gov/library/viewRecord.do?id=3474
[2] Presentation by Risk Analysis Division, November 19, 2008 – "Risk Mapping, Assessment and Planning (Risk MAP) Update for Flood Mapping Coalition"
[3] Federal Register, Vol. 73, No. 206, October 23, 2008

with regards to the digital transition and (3) to provide recommendations to FEMA that may be used to improve or modify the policies related to the digital transition.

Concerns

The general concern related to the limited distribution policy can be characterized by its unknown impact specifically to floodplain management activities and therefore on the National Flood Insurance Program (NFIP). The policy may well have an adverse impact on overall floodplain management, participation in the NFIP or result in less effective local programs.

Specific concerns and questions that stakeholders have are:

- Where will stakeholders and communities go to get paper maps once FEMA ends distribution? Who will pay for these printing costs?
- Who will fund or will funding be available to help transition to digital data products and tools?
- Are all distributed flood map products consistent with regards to content?

Recommendations

There is certainly more that can be done to help with the digital transition. Thirty percent of the country is not covered by digital data and users in these areas are not sure what will happen to them. Better communication, training, and education will be vital to a successful transition – FEMA should be communicating its plans to support stakeholders before and after the limited distribution policy takes effect. It is paramount that the flood hazard data, products and tools provide full accessibility to complete and accurate flood hazard information so users can successfully complete their jobs regardless of their digital capabilities. For available digital flood hazard products and tools it is critical that everyone understands what is in the data and how the data are to be used or not used. Most importantly, users need to be confident that the data can be trusted.

The Digital Transition is moving in a positive direction based on the results of the web-based survey and interviews presented in this report along with FEMA's own metrics for Map Modernization. Cost savings and benefits have already been realized and will continue as more communities, businesses and stakeholders develop the capacity and capabilities to utilize digital data products and tools.

Many stakeholders already have and many more will have the capabilities to transition to digital data and products. Those that are transitioning and are willing to go completely digital will benefit from a gradual transition as it would lessen the financial impact and allow them to fully convert their systems and train their staff. However, there will always be communities and stakeholders that will need paper maps and absent solutions to provide printed maps for these communities and stakeholders, the digital transition would still continue successfully even if placed on a gradual implementation timeline.

Until such a time that FEMA can provide stakeholders with resources for paper map requests or the capacity to utilize MSC digital tools and products, FEMA should provide at least one of the following resources:

1. Support paper map requests through a Print-on-Demand service from the Map Service Center. FEMA should provide exemptions to the limited distribution policy for NFIP

community stakeholders – or State and local agencies that support these communities – that need more than one copy of the paper maps.

2. Establish and make available to stakeholders a list of currently known private vendors or public agencies that have qualified Print-On-Demand services and/or capabilities to support paper map requests with fee exemption for NFIP communities. This would provide communities with a place to request printed maps.

Moving forward, FEMA should:

3. Provide funding mechanisms, guidelines and logistical support to establish Print-on-Demand services. Funding options would enable private companies and public agencies to provide print services – for States and communities this could be accomplished through Community Assistance Program (CAP) or Cooperating Technical Partner (CTP) channels. Guidelines and logistical support would ensure consistent map production and printing standards along with direct access to digital flood hazard map products. Guidelines would also facilitate the process of helping private vendors or public agencies get established as a qualified Print-on-Demand service provider – essentially these service providers would have MSC-like capabilities.

4. Provide funding mechanisms that would help establish digital capacity for States and communities. This would provide the community with a minimum technical capacity to view and print maps as needed. Again for States and communities this could be accomplished through Community Assistance Program (CAP) or Cooperating Technical Partner (CTP) channels.

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1.0 Introduction

1.1 Summary of Digital Transition

The Federal Emergency Management Agency (FEMA) publishes Flood Insurance Rate Maps (FIRMs) that are used for hazard identification, floodplain management, and flood insurance in the National Flood Insurance Program (NFIP). FEMA has been providing flood hazard maps since the 1970s to help manage and reduce risk for the more than 20,000 communities that participate in the NFIP. Historically, FEMA provided flood hazard information through paper Flood Insurance Rate Maps (FIRMs). FIRMs show zones with high flood hazard, the height of the flood water and other contextual information such as roads and political boundaries.

In 2003 Congress funded the Flood Map Modernization (Map Mod), which enabled the upgrade of paper FIRMs to the digital geo-spatial platform. FEMA's Digital Vision is the comprehensive approach implemented during Flood Map Modernization to transition from paper to digital products. Map Mod is creating new digital products or converting the National Flood Insurance Program (NFIP) paper map inventory to digital products and moving to digital delivery of these products via the Internet.

In the NFIP Reform Act of 2004, Congress included Section 107 establishing digital geospatial flood hazard data distributed by FEMA as having equivalent legal standing to the paper maps[4]. FEMA's Policy for *Use of Digital Flood Hazard Data* (November 29, 2007) implemented Section 107 and as part of that policy over the past several years, FEMA has introduced new digital products including digital map images (e.g. the full size FIRM Scans and letter size FIRMettes) and digital geospatial flood hazard data such as the Digital Flood Insurance Rate Map (DFIRM) Database product and the National Flood Hazard Layer (NFHL). These digital products now make up the majority of the flood hazard information distributed by FEMA.

1.2 All Digital Distribution

Beginning on October 1, 2009, customers may order only digital flood hazard maps and reports. FEMA's Map Service Center (MSC) will not produce or distribute paper Flood Insurance Rate Maps (FIRMs), Flood Hazard Boundary Maps (FHBMs), or Flood Insurance Study (FIS) reports on or after this date, other than a single paper copy provided to communities when their maps are updated[5]. Reasons[6] provided for this change are:

- FEMA expects to save $3.5 million annually
- Digital versions will provide greater utility
- Reducing redundancy between digital and paper products

[4] Section 107, Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (42 USC 4101)
[5] Moving to Digital Fact Sheet – *Attachment 1* or http://www.fema.gov/library/viewRecord.do?id=3474
[6] Presentation by Risk Analysis Division, November 19, 2008 – "Risk Mapping, Assessment and Planning (Risk MAP) Update for Flood Mapping Coalition"

- Enabling a transition to products that are produced as needed with the most current information

FEMA will discontinue all other distribution of paper maps and study reports beginning with map update projects where the letter of final determination is issued on or after October 1, 2009. The letter of final determination is issued six months before new flood maps become effective for NFIP regulatory purposes. FEMA will continue to provide digital flood hazard data products for Internet download, on CD–ROM, and via Web Mapping Service. Federal, State, and local government customers that have been receiving paper products will now receive digital flood hazard maps and data, and continue to be exempt from fees (specified in 42 U.S.C. 4101)[7].

1.3 National Map Modernization Program Metrics

Program Metrics[8] are high level national and regional measures that report on the status of Digital Flood Insurance Rate Map (DFIRM) production. The tables below illustrate the end goals through Fiscal Year (FY) 2009 of Flood Map Modernization (Map Mod) and what percentage of these goals has already been met for FY 2008.

Metric 1 - Percent of Population with Digital GIS Flood Data

Year (FY)	Goal	Actual
2004	20%	17%
2005	40%	39%
2006	50%	48%
2007	60%	60.3%
2008	70%	70.2%
2009	92%	

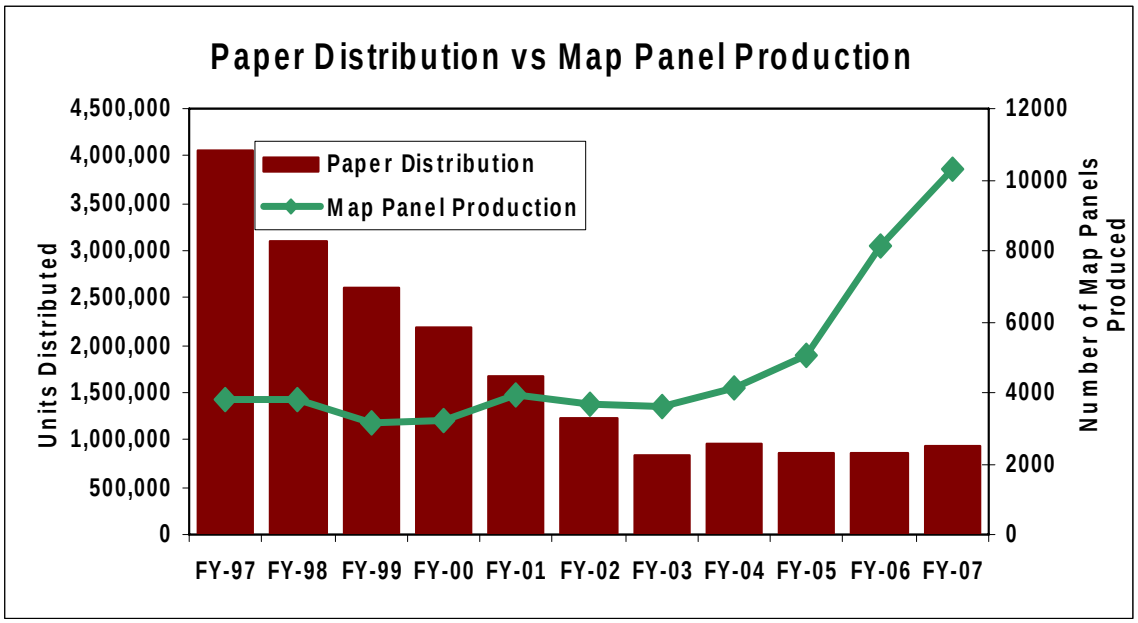
Metric 2 - Percentage of Population With Adopted or Effective Maps that Meet Quality Standards

Year (FY)	Goal	Actual
2004	10%	8%
2005	20%	16%
2006	25%	23%
2007	35%	32.1%
2008	50%	46%
2009	85%	

As Map Mod has progressed, the distribution of paper maps has decreased. According to FEMA's Risk Analysis Division, paper map distribution has declined substantially with a 75% reduction in paper distribution from FY1997 to FY2007 despite a 300% increase in map panel production (Figure 1).

[7] Federal Register, Vol. 73, No. 206, October 23, 2008
[8] https://hazards.fema.gov/femaportal/wps/portal - Accessed 8/25/2009

Figure 1



From Presentation by Risk Analysis Division, November 19, 2008 –
"Risk Mapping, Assessment and Planning (Risk MAP) Update for Flood Mapping Coalition"

The limited distribution of paper maps is intended to allow FEMA to realize significant cost savings in the map update process by eliminating the need to generate large format film negatives to support offset printing. It is also intended to save the cost of printing and distributing the paper maps to fee exempt customers.

1.4 Purpose

The objective of this report is to (1) provide FEMA with a list of impediments or adverse impacts of limited paper map distribution, (2) present the current status of stakeholder understanding with regards to the digital transition and (3) to provide recommendations to FEMA that may be used to improve or modify the policies related to the digital transition.

There is strong support from FEMA flood hazard map users and stakeholders for the development of Digital Flood Insurance Rate Maps (DFIRMs) and the related GIS data bases. And there is acknowledgement that these efforts will provide tools that will be extremely useful for flood mitigation and flood loss reduction efforts along with the ability to more accurately determine the risk of individual structures. However, there is concern from many of these same stakeholders about the decision that nearly eliminates the publication of paper FIRMs as the digital transition goes forward.

The general concern related to the limited distribution policy can be characterized by its unknown impact specifically to floodplain management activities and therefore on the National Flood Insurance Program (NFIP). The policy may well have an adverse impact on overall floodplain management, participation in the NFIP or result in less effective local programs. These impacts may come about as a result of:

- The cost and workload required at the State or local level to support paper map users

- Smaller communities without the capabilities to utilize digital products or tools of any kind due to:
    - Lack of modern computer hardware, software, printers (including plotters) or internet connection that can install and utilize data intensive digital products, even if provided as a PDF
    - Lack of trained personal on latest computers or software
    - Lack of publically accessible computer monitors for viewing digital only
- State and locals that for the most part do not have the capabilities to take on the role of the FEMA map warehouse function to support paper map users
- Communities that may not realize that they have a flood map, especially with staff turn over, if the paper map is not present
- Communities in which building officials have many roles in addition to being the floodplain administrator. These officials know how to read and interpret a paper map but often do not have a comfort level with computers

The concerns above are related to the recognition that there will always be a need for paper maps for stakeholders without a certain level of digital capacity, be it funding, software, hardware, internet, training or personnel. Without digital capacity, these stakeholders will need a resource from which they can request maps as needed.

Beyond the concerns related to floodplain management and the NFIP, there are more specific and practical questions related to the impacts of the limited paper map distribution policy and more generally the ways in which users need and utilize maps. Questions such as:

- Where will communities get additional paper maps once FEMA discontinues printing?
- Who will pay for the production and/or distribution of these paper maps?
- What are the uses where paper will still be the only choice or the best choice even if it takes some effort to obtain?
- For what uses are large format paper maps still needed?
- Do communities maintain one or more full sets of paper maps? How many?
- How much do people know about the MSC Web site products and tools and what they have to offer? Has FEMA successfully reached their users?
- Which FEMA map products and tools are being used and which are not?
- Can users get the product they need with the new MSC tools and datasets?
- Why are people migrating to digital and why are some people resisting?
- What are the obstacles people have when migrating?
- What is the cost of migrating? (time and $)
- What is the cost of maintaining hardware, software and trained personnel that may be required to view or print digital data?

1.5 Approach

The main concerns, questions and recommendations presented in this report were derived from a web-based survey and phone interviews with ASFPM members and stakeholders. Although subjective, stakeholder opinions are an important piece in adoptions of new methods and technology. It is imperative to know who is migrating and who is not. For those who are not, are there large groups that have similar causes for not transitioning? If so, what must be remedied

to allow the digital transition to be a success? For those unable to transition, what resources will need to be provided to support successful floodplain management practices?

Prior to the presentation of the web-based survey and phone interview results, Section 2 of this report provides background information on FEMA's Map Modernization program along with the current status of digital data products and tools available via the Map Service Center (MSC).

Using a web-based survey completed by the ASFPM many of the initial questions and concerns from Section 1.4 above were answered and an overall picture of the status of the Digital Transition was formed. The summary of the online survey is presented in Section 3.1. Focus was then placed on issues and areas that may need more review and were not fully answered by the web-based survey. To get more in-depth answers and understanding of how stakeholders feel about the Digital Transition, ASFPM interviewed nine stakeholders from different backgrounds ranging from large to small public agencies as well as private firms. These interviews have been transcribed and summarized in Section 3.2 and 3.3.

From the survey and interviews, information was transcribed, compiled and summarized to list all the obstacles of the Digital Transition and all that experienced these issues. Section 4 presents a list of recommendations for FEMA to consider with regards to the limited distribution of paper maps and to help stakeholders with the transition.

In addition to the survey and interviews an evaluation and review was performed on FEMA's digital data, tools and products using individuals who had not previously used the products or tools in order to gauge the difficultly in using FEMA's Map Service Center (MSC). The evaluation is provided in *Attachment 2*.

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2.0 Background

2.1 FEMA Map Modernization

Since 1973, FEMA has compiled, printed and distributed Flood Insurance Rate Maps (FIRMs) containing flood hazard features (e.g., flood hazard areas, BFEs, risk zones) and base map features (e.g., roads, hydrography, municipal boundaries, and sometimes PLSS section lines). The original paper FIRM was a planimetric map that utilized grayscale printing and contained all the cartographic elements (e.g., legend, scale bar, title, panel #, locator map) needed to make the map usable.

Through the 1980's, digital data mostly in the form of Computer-aided Design (CAD) files were beginning to be used to process and produce the paper FIRMs. Geographic Information Systems (GIS) data came of age in the 1990's and FEMA joined the technology transformation by releasing Q3[9] data. However, due to limited horizontal control on the FIRMs, digitizing hardcopy FIRMs results in distortions of the floodplain boundaries. In addition, Q3 data were lacking BFEs, cross sections, and other features shown on paper maps making it difficult to use Q3 data within GIS for mapping applications related to flood insurance and floodplain management.

The accuracy standards developed as part of Map Modernization (e.g. the Floodplain Boundary Standard) enabled the Digital Flood Insurance Rate Map (DFIRM) datasets developed during Map Modernization to be used more effectively with a variety of other more current and accurate GIS datasets, which include orthophotos, roads, building footprints and parcel boundaries to name only a few.

The DFIRM is defined[10] as follows:

> **Digital Flood Insurance Rate Map (DFIRM) –** A Flood Insurance Rate Map that has been prepared as a digital product, which may involve converting an existing manually produced FIRM to digital format, or creating a product from new digital data sources using a Geographic Information System environment. The DFIRM product allows for the creation of interactive, multi-hazard digital maps. Linkages are built into an associated database to allow users options to access the engineering backup material used to develop the DFIRM, such as hydrologic and hydraulic models, Flood Profiles, data tables, Digital Elevation Models, and structure-specific data, such as digital elevation certificates and digital photographs of bridges and culverts.

FEMA has two formats for DFIRM datasets – one is called "planimetric" and looks very similar to the hard copy FIRMs and another format that includes orthophotos as a base layer. The orthophoto-based format requires different cartographic symbolization for usability. Additional color is required to make the map readable, which also requires different printing capabilities. It

[9] Digital Q3 Flood Data has been developed by scanning the existing FIRM hardcopy and vectorizing a thematic overlay of flood risks. The vector Q3 flood data contains only certain features from the existing FIRM hardcopy.
[10] Glossary: Guidelines and Specifications for Flood Hazard Mapping Partners (April 2003)

should be noted that some States (e.g. Delaware) have opted to continue using the planimetric format without orthophotos as a base map.

Through the transition from paper to digital data, FEMA's roles have also transitioned. Where local community and nonfederal sources of base map data are not available, FEMA utilizes national GIS datasets for the base map features such as U.S. Geological Survey orthophotos quadrangles or the U.S. Census Bureau's TIGER/Line features. As more States and locals produce GIS base map datasets that meet FEMA's accuracy requirements for use with the digital flood hazard data, FEMA's role in performing quality control and distribution of the national base map datasets has decreased. The increase in quality State and local datasets allows FEMA to focus less on base mapping and more on the flood hazard information. In this regard, the Nov. 29th, 2007 policy (*Use of Digital Flood Hazard Data*) described previously, more clearly defines (1) FEMA's published products (Section VII Policy: B. Policy) and (2) FEMA's legislated responsibilities with regards to official FEMA designations of flood hazard information. The published products described are:

- Paper Maps - FIRMs
- Digital Map Images
    - Full Size FIRM Scans
    - Letter Size FIRMettes
- Digital Geospatial Flood Hazard Data – DFIRM Database

The legislated responsibilities provided by 42 U.S.C. 4101 make all the above products and the printed versions produced from the official digital products equivalent and official FEMA designations for:

- Areas of Special Flood Hazard (SFHA)
- Base Flood Elevations (BFEs)
- Insurance Risk Zones, and
- Other Regulatory Information

A distinction needs to be made between FIRMs (FIRM Scans) derived from DFIRMs and those derived prior to DFIRMs. FIRM Scans derived prior to DFIRMs are based on the original paper map, which is scanned and then georeferenced. Both the scanning and georeferencing process introduce horizontal (spatial) errors. When referencing locations on FIRM Scans derived from paper maps the flood hazard is referenced relative to the base map features such as roads. Newer FIRMs began showing a coordinate grid on the printed effective FIRM when derived from the DFIRM database. Based on the Nov. 29th, 2007 policy "(W)hen a coordinate grid is shown on the printed FIRM or when the DFIRM database is available, the horizontal location of the flood hazard information is defined with respect to the primary coordinate system shown on the printed FIRM or stored in the DFIRM Database product". The horizontal location of the flood hazard information is not defined by its relationship to the base map features as is the case for FIRMs prior to the availability of the DFIRM Database.

Digital flood hazard map products distributed by FEMA include the FIRM Scans and the DFIRM as described previously and additionally include the National Flood Hazard Layer (NFHL) GIS data set and the NFHL Web Map Service (WMS). The NFHL is a statewide GIS dataset, only where FEMA has modernized maps, and includes Letters of Map Revisions (LOMRs). The WMS is a web map service with defined map symbology meant for use within a GIS or other mapping software.

Tools that provide access to print or view the digital flood hazard map products described above include:

- FIRMette Desktop (F-MIT) – desktop software to create a map from a portion of the FIRM Scan
- FIRMette Web – Internet software to create a map from a portion of the FIRM Scan
- MapViewer Desktop – Desktop software to make maps and view attribute data from the DFIRM or NFHL
- MapViewer Web – Internet software to make maps and reports from the NFHL
- NFHL Google Earth utility – files that allow the viewing of the NFHL Web Map Service in Google Earth

The fact that the NFHL Web Map Service (WMS) and the Google Earth Utility files (.kmz) both adhere to OpenGIS Standards allows them to be used and displayed outside of proprietary GIS software such as ESRI's ArcGIS. Recognizing that some GIS software is too expensive for smaller communities, FEMA has provided several resources, including the use of Open Standards to make their digital data and products available to a larger population and these actions are commendable.

The FEMA Map Service Center provides complete information about the digital flood hazard data products, free tools, and instructions for using them at *http://msc.fema.gov*.

2.2 FEMA DFIRM Databases

As Map Mod has progressed FEMA has undergone a transition in its collection, storage and retrieval of technical and administrative data needed for a Flood Insurance Study (FIS) or Flood Insurance Rate Map (FIRM) revision. FEMA describes the Standard DFIRM database and the Enhanced DFIRM database in *Appendix L: Guidance for preparing Draft Digital Data and DFIRM Database* in the *Guidelines and Specifications for Flood Hazard Mapping Partners (April 2003)* as follows:

> The **Standard DFIRM Database** is provided to end users who do not require the complete engineering backup data; however, it is not intended to limit the scope of the GIS data collected and submitted to FEMA. The full GIS database that contains all of the available flood study information is called the Enhanced DFIRM Database
>
> The Standard DFIRM Database was designed to present the effective flood hazard information published by FEMA. Users who only need to know whether a structure is in or out of the Special Flood Hazard Area (SFHA) or what the base flood elevation is for a location will be able to use the Standard DFIRM Database. Users who want to reference the engineering analyses or utilize any of the supporting data behind the effective flood hazard data will need to use the **Enhanced DFIRM Database**.

The Standard DFIRM database, or DFIRM, is the currently implemented and distributed version of FEMA digital flood hazard data for each community. The DFIRM is delivered in three digital data formats:

1. ESRI Arc Shapefiles
2. ESRI Arc Export Files
3. MapInfo Files

While the standard DFIRM database has been implemented and distributed, the defined approach of the Enhanced DFIRM database has been transitioned into the Data Capture Standards (DCS) [11]. The current DCS provide a consistent framework for submitting, storing and retrieving study data or "backup data" that is utilized to derive the FIS and FIRM.

Essential flood hazard datasets and information used to derive the FIS, SFHAs, BFEs, insurance risk zones and map products include, but are not limited to:

- Engineering Models
  - Hydrology inputs/outputs
  - Hydraulic inputs/outputs
- Floodway Data Tables
- Cross-sections
- Digital Elevation Models (DEM)
- Coastal Transects
- Stillwater Elevations and wave setup
- Base map features
  - Road and railroad center lines
  - Political boundaries
  - Digital Ortho Quarter Quads (DOQQs) – FEMA default data
  - Orthophotos

The DCS provides for a common storage location of the essential and related components needed to derive the FIS and subsequently the DFIRM.

2.3 Technical Capacity for Digital Data and Products

In order to work with the various digital products and tools it is important to understand the level of technical capacity that would be required to utilize those digital products and tools. Capabilities and resources (listed below) to be considered range from hardware, software, network, and expenses, etc. Many of these capabilities were mentioned in the survey or interview responses. This list is not comprehensive as the potential of hardware, software and networks is constantly evolving and generally becoming faster and more efficient:

Hardware

- Computers – desktops, laptops, kiosks
- Printers – large/small format, color/black & white, high-speed
- Map folding machines
- Copier – black & white, color
- Monitors – standard, touch-screen
- CD/DVD Drives – read only, read/write
- Other Peripherals – portable hard-drive, data storage, backup & archiving

Software

- GIS Software (ESRI, MapInfo, Google Earth, Open Source)
- Adobe Acrobat (Standard, GeoPDF Viewer)
- Image Viewers (PNG, TIFF, JPEG)

[11] Appendix M: Guidelines and Specifications for Flood Hazard Mapping Partners (Sep. 2008)

Networks
- Internet access/connection speed (Dial-up, T1, T10, Broadband)

Professional Staff
- GIS, technical, administrative staff

Training
- Basic computer skills
- GIS skills for analysis, editing, and cartography

Maintenance
- Hardware, software, plotters, copiers

Miscellaneous Expenses
- Postage, paper, ink/toner

Facilities and Space
- Office space

Minimum capacity levels may then be defined based on the range of the digital datasets offered via the MSC and the resources available to support them. The minimum capacity level to support digital data would be based on characterizing the lowest level of digital data that would be delivered to a community. A digital image – PDF or PNG – containing a basic FIRM panel delivered via a CDROM disk may be considered the lowest or simplest form of digital data that could be delivered. To display or print this image file, the following capacity requirements would be needed:

Hardware
- Computer – includes standard components (monitor, CD-drive, keyboard, mouse)

Software
- Image viewing software (e.g. Adobe Reader) with print capabilities

Network
- No network needed

Professional Staff
- Staff familiar with computer operations and image file formats

Metadata
- Standard metadata

Usage Guidelines & Procedures
- Appropriate usage
- Viewing Software
- Printing Guidelines

The intent of this section is to describe various capacity levels and highlight the range of issues that need to be addressed in order to make some form of digital data available to every user community. Beyond the minimum capacity level, the larger goal is to provide defined capacity levels that can be used to understand exactly what digital data can be utilized by a community based on their current and future capacity. For example, if a county currently has a GIS Specialist with 2-years of experience, an 11”x17” black/white printer and is budgeted with 20% time to floodplain mapping – What digital data would best meet their needs? It should be noted that initial budgeting and cost issues would need to be considered when implementing GIS solution; however this increase should be measured against the long-term benefits. And again it should be recognized that there will always be some communities that will require a paper map.

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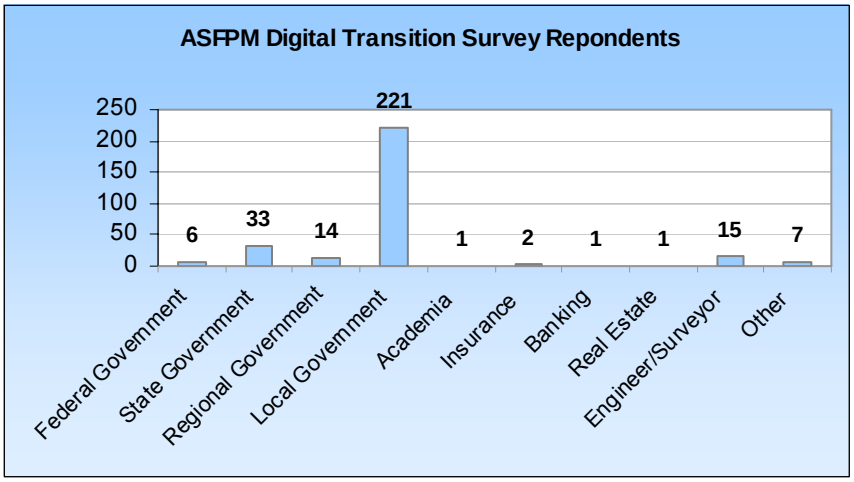
3.0 Stakeholder Survey and Interviews

3.1 ASFPM Digital Flood Map Transition Survey

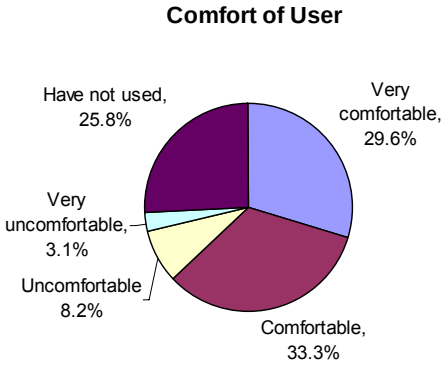
ASFPM conducted a general survey to get a better understanding of who was using the FEMA maps and tools, both paper and digital; how they were being used; the level of satisfaction with the maps and tools; and generally how users felt about the digital transition. The questions used for the web-based survey have been provided in *Appendix A* with a summary of the survey answers and responses provided in *Attachment 3* of this report.

ASFPM commissioned an on-line survey to gather information on these topics. The survey was sent to approximately 2,200 ASFPM members and stakeholders with 301 responses received.



The respondents were from various disciplines ranging from planners, emergency managers and engineers, with a majority describing their primary job as the floodplain administrator. Each respondent uses the FEMA maps, data, and tools in many different ways with the largest group to respond being stakeholders from local government. The size of community served was less than 100,000 by more than half the respondents – 25% served communities between 10,000 to 50,000 and 13% served communities less than 10,000.

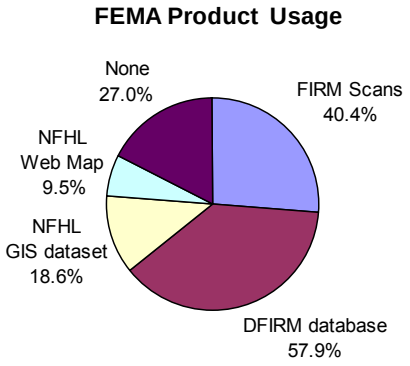
The survey shows that the majority of users of the FEMA digital flood hazard data and tools felt comfortable using FEMA's products. However, more than 25% had never used the FEMA products. Of the products used, DFIRM databases were used the most with FIRMScans following as next most used.



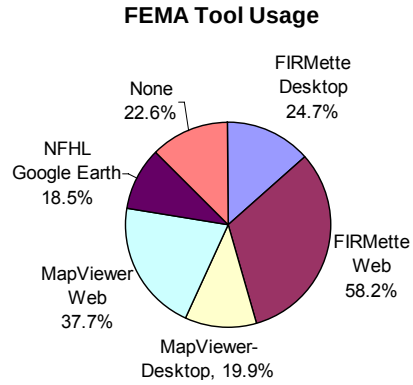
The survey notes concern that there may be a higher cost to the user now that FEMA will no longer ship new maps. Some organizations estimated that establishing

new capabilities to print the digital product may cost up a significant amount in the first year; others foresee no additional cost. Many feel that annual costs would likely be a few thousand dollars.

Another concern is access to the data. Nearly 40% of respondents stated they could not access the Digital Flood Insurance Study (FIS) reports. This may be related to the 47% of MSC users that feel the on-line instructions were not clear.

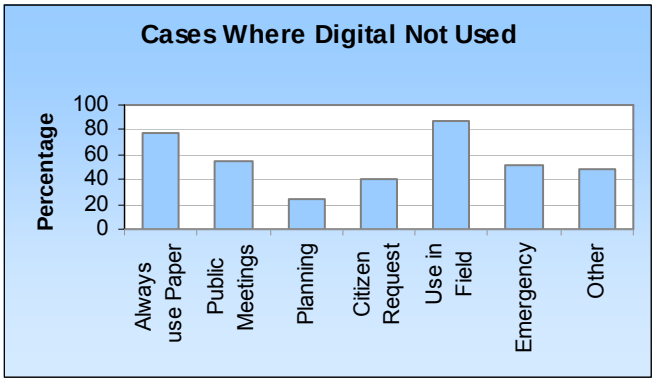


That said, of those that had used the MSC web site, almost 70% of users stated they liked using the Digital Flood Hazard Data and Tools. Over 80% of respondents say they found what they were looking for and over 75% said the web site's performance was moderate to very fast. Almost 75% of users stated they had a good overall experience on the MSC site.



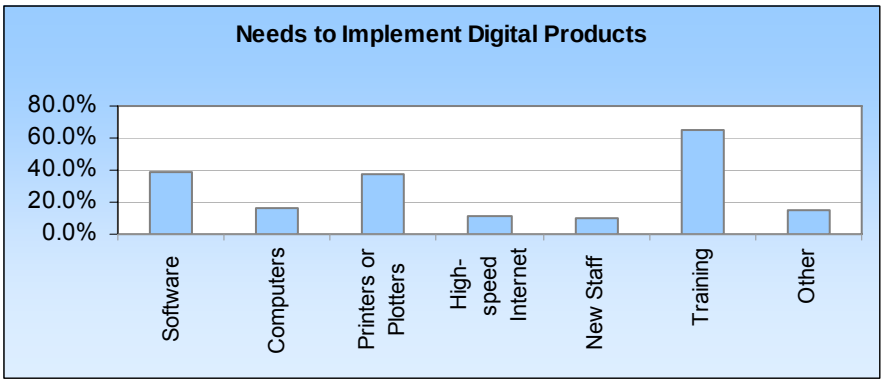
The survey shows that while most users have tried the digital products just over 3% use only digital products. More than 66% are using a mix of paper and digital products. More importantly, nearly 30% of respondents use paper products only, 55% feel they need more than one copy of each FIRM, and 36% have no plan to print in-house.

ASFPM also felt it was important to have direction from the stakeholders as to when digital products or tools would not be appropriate, meaning situations in which they would need a paper map. Nearly 75% of respondents stated at least one time when they do not feel they can use digital products and must rely on paper maps. There are a variety of reasons given, ranging from a lack of hardware; Internet connection problems; other technology hurdles; and lack of trust in the digital data, etc.



Technology is another expected hurdle in the adoption of a fully digital product. Although nearly 98% of respondents have access to computers in their office, a transition like this still may require new computers, software, printers, staff, and training – this survey shows that nearly 60% of respondents feel they needed one of more of these and having more training stands out

among them. Not well noted in the graph below is that more than 50% of users do not have access to a plotter at least 36" wide. Nearly 20% report not having any printing capabilities at all.



Some 85% of respondents said they would use the current FEMA digital maps and products while 22% believe the digital transition will have a negative impact when considering time/cost vs. benefits.

This survey offers the view that the adoption of the digital products is going well, however there are still some issues that need attention. Section 5 of this report presents these issues along with recommendations to address them.

3.2 Stakeholder Interviews

After reviewing the previous ASFPM survey it was demonstrated that a majority of the surveyed users are already using or are moving toward use of the FEMA Digital Maps and Products. However there are still instances when paper maps will be required and areas that needed improvement as some stakeholders face real obstacles in adopting the digital information.

A short interview format was designed to allow users to talk freely of their experience with the digital transition, the FEMA data products and tools and any of their needs or requirements for paper maps. The interview format provided open-ended questions focusing on the issues that were raised in the previous survey and through other ASFPM stakeholder feedback. Interviews were given to 9 individuals from various backgrounds and experience levels related to the use of flood hazard maps, both the paper and digital products. The interview was focused to fill in gaps previous studies could not provide.

The ASFPM web-based survey presented in the last section answered a lot of questions related to the digital transition, but it did not allow us to ask why they were or were not using digital products or why they required paper maps? The previous survey also did not allow us to ask details on the problems they were having or exactly how the new tools were helping. There was no story behind the answers.

The interviewees represent private consultants, county utilities, banks, flood zone determination companies, Insurance companies, local and state government. Although we had both public and private participation in the interviews, the populations (citizens or customers) that are served through these individuals varied: from under 10,000 to over 800,000. The interviewees were

selected at random from within different floodplain management segments (e.g. local or state floodplain manager, building official, and insurance agent) and were characterized by single individuals as well as public leaders that represent hundreds of third party private companies to several hundred communities requiring differing levels of flood map services. The interview questions and guide is provided in *Appendix B*.

3.3 Review of Interview Questions and Responses

Without differentiating between digital or paper maps, the first question asked participants about how their organization used the Flood Insurance Rate Maps (FIRMs). Responses included uses for permitting and compliance to use as an outreach tool in explaining flood risks to communities. Responses also included FIRM use for rating flood insurance, training, handling public inquiries, mitigation programs and post-flood emergency response – all typical uses of FIRMs. One participant stated they are rarely used but are handy for Grandfathering[12] and Coastal Barriers Resource Act (COBRA)[13] zones.

Based on the uses described above, participants were asked as a follow-up to Question 1:

> **When you need a map for any of the above, do you need the standard FEMA FIRM (large format 36" x 26"), or would you produce or could you use a customized map at a different scale or page size with other information?**

Most survey participants could make use of custom mapping but almost all also stated that they require paper maps for a wide range of uses. In one case, the individual deals with multiple parties and states that require both lenders and insurance companies to request paper products. Paper is their best format for training – especially when everyone does not have a computer – and in most cases the standard size is needed. This was echoed by another participant. In another case, the person needs a paper map when in the field doing work. It was acknowledged that FIRMettes can be used for easy-to-find locations but in many cases the locations sought are not well marked and standard maps are needed. Respondents have found some on-line products to be incorrect and note that FEMA has directed them to an incorrect map. Another individual uses paper for LOMA applications, while another uses paper for manual flood determinations.

One-third of the participants would prefer digital products and do not need paper maps. The ability to modify the map scale and thus map detail are qualities of using digital data that these individuals listed they liked about the digital products.

The third question asked if the participants maintained one or more full sets of paper maps along with asking how many and why? All participants but one has their own set of maps and most have more then one set. For larger governments and companies, many map sets are maintained numbering in the hundreds and thousands to cover their designated areas. In the one case without maps, the individual utilizes the counties' copies if needed. Individual responses had a range of maintained map sets as follows:

[12] For an overview on Grandfathering - http://www.fema.gov/library/viewRecord.do?id=3745
[13] For and overview on COBRA - http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/cbrs.shtm

- 1-2 copies (for several thousand maps),
- 3 current sets plus several archived maps,
- 5-6 sets for several hundred communities,
- 1 set of each map in multiple regions plus maps that are sent to field engineers,
- 1 old set and 1 new of each map covered,
- 2-3 sets for the city (all copies not needed),
- 5 sets but does not feel they need all of them

Questions 4 through 7 asked the participants if they were currently using any of the FEMA Map Service Center (MSC) digital tools and products. Follow-up questions asked that if participants were not using the tools and products were they aware of them and any obstacles to the tool or product usage. If the participants were using the products and tools, they were asked about which ones they used, how they were used, their experience level and circumstances when they would not be able to use digital products or tools.

All participants, but one, have used the MSC Web site. The lone participant that had not used the Web site stated that they would like to use the web site for convenience and to save on storage. For this individual, an easy-to-use tutorial was requested.

Of the tools everyone has used, the FIRMette Web seemed to be popular with both beginner and intermediate level users. Other tools that users with basic skill levels used were the MapViewer Web and the FIRMette-Desktop (F-MIT). At this level, some participants were not aware of all the tools and tool function and there also was difficulty using the tool. In one case a statement was given that the FIS reports could not be downloaded and the reports needed to be ordered.

Three individuals were more advanced and considered themselves as intermediate to expert users. In two of these cases not only were they using all or the majority of the tools but they also had ideas on how to enhance them. They want to use the Google tool to provide flood risk to home owners, show real-time flood information, and provide emergency evacuation plans.

The third ‘expert’ participant was primarily using the NFHL datasets and the FIS reports. This person found several mistakes in the data and had a difficult time working with FEMA at both the national and regional levels to get the data corrected.

Though most seemed enthusiastic about the on-line tools there were several cases where participants could not use the digital maps. The responses to the follow-up question (7B) in which they were asked: ***When can you NOT use digital maps?*** were:

- Paper is official according to FEMA (stated in two interviews)
- Pulling cross section information
- 30% of nation not digital (stated in two interviews)
- Public requests paper
- Computers can’t handle FIRMScans or large files
- Often not enough time to produce something on-line
- Conducting training on a limited budget
- Small communities do not have computers
- When a location could not be found using the digital products
- When the web site is incorrect
- When more than 2-3 maps are involved

- Do not trust…too many errors on the digitized maps and too hard to get maps corrected
- Has not had an issue or need (stated in two interviews)

Question 8 of the interview asked:

> **Would you use training or educational tools for the FEMA MSC Tools and Data if they were available? Do you think more training would be useful? If so, what method would be most useful? Why?**

Respondents felt that many of these issues could be solved through training to help users understand the tools and data, and to make them feel more comfortable with what they are doing. Everyone stated that more training was needed both personally and for individuals with which they work. The most popular ideas were for classroom training, on-line tutorials, Webinars, and a hotline "help" number. Other items were downloadable PDF lesson plans, DVD or other media that can be mailed for those without access to the Web, a traveling seminar, a discussion board, something not on-line, and a Floodsmart.gov Web page with tutorials and a test.

Having specific training for the public as well as basic instructions for sectors such as real estate agents, insurance agents, engineering firms, and lenders was mentioned.

When FEMA halts shipments of paper maps it is important to see where individuals believed the burden of printing would fall for those that require paper maps. Question 9 directly asked:

> **Where would you request paper maps if you can not get maps from the MSC? Why?**

There will be cases when users cannot access the MSC or computer resources to produce the needed maps for various reasons. This question was an effort to understand where this group would foresee going to find the paper maps. The respondents were generally speculating and have no plan in place to acquire maps if they can not produce them. Answers to the questions about possible organizations or agencies from which to request paper maps were placed into 6 categories as follows:

Local
- Local Floodplain manager
- Planning department
- Building inspector
- County offices
- City Hall
- Library

Regional
- FEMA regions

State
- State Flood Plain Coordinator (rarely happens)
- State DEC

Federal
- FEMA

Private
- Service through the floodplain determination companies
- GIS Consulting firm for Fee

Other
- Print internally
- You tell me…

The final question of the interview provided an opportunity for the participant to offer their opinion or comment on the digital transition and/or the limited distribution of paper maps. Below is a transcribed list of the Interviewee's opinions or comments:

- DFIRM needs to be timely. This should be available before it goes into effect not after, since it is too late by then. (This was repeated in 3 interviews).
- Get rid of the FIRMs and switch to DFIRMs. Technicians are using the FIRMs for scaling structures. The DFIRMS would be far easier with which to work.
- Glad to see paper go away….
- Digital will be a huge asset.
- This must be available to everyone including at home.
- How are maps validated now that anyone can make a map? Where is the authority?
- Tools must be user friendly, easily/quickly updated, with accurate data.
- People will see cost go up. This will be due to the time required to create a map as well as the plotter cost (hardware and consumables) to print them.
- State organizations are worried about everyone coming to them – they do not have the space, time, money, or staff to handle new requests.
- If access is not easy and inexpensive, people may abandon using the flood plain maps.
- This is a great thing but most of the country is not ready for this transition and problems could surface a few years down the road when current equipment breaks down and must be repurchased, or map validation goes awry.
- Can the FIS be updated at the same time?
- The digital data and products need to be user friendly! I just need to get familiar with the tools and products, in order to start really using the tools.
- The digital data and products is more accurate and more applicable for municipalities, i.e., allowing to zoom in for hydrants, sewers etc.
- After recent floods the public doesn't have confidence,
- Needs more accuracy, time is being wasted…would LIDAR help? This respondent had a very bad experience to this point with map accuracy, but still favors the change, but is very worried about accuracy and technical issues.

3.4 Additional Feedback

Some concerns reflected in the phone interviews were similarly communicated to ASFPM directly – these concerns are generally related to digital data distribution and differences between digital datasets as well as differences between digital data and the paper map content.

The National Flood Determination Association (NFDA) provided results of a survey (*Attachment 4*) of its membership related to this issue and also shared a presentation (*Attachment 5*) that put forth their overall issues and concerns. From the NFDA survey it was felt that FEMA must deliver the digital products on a timelier basis (i.e. 4-5 weeks before the effective date). One response indicated that 30-40% of the time it does not arrive at all and another response stated that they have never received any DFIRMs from North Carolina. Consequently, the paper maps are needed as a "stable back-up."

One of the main concerns for smaller- and medium-sized NFDA member companies was the anticipated cost/time factor in changing how they do business as several of the members still rely on the paper maps solely for the purpose of manual determinations. They will need time to change their systems along with time to train their staff.

There were also issues related to distribution of digital products such as poor quality raster TIF files (image files) for FIRMs and frequently incorrect World files (.tfw or .pnw) that are included with every image. To display images within a GIS along with other data, it is necessary to establish an image-to-world transformation that converts the image coordinates to real-world coordinates. This transformation information is typically stored with the image. Some image formats, such as GeoTIFF store the georeferencing information in the header of the image file. However, other image formats store this information in a separate ASCII World file, which contains the real-world transformation information used by the image. Without the World file, the image can not be used as a geospatial product and with an incorrect World file the image could not be used to locate accurately features relevant to the flood hazard represented in the image.

In summary, the survey showed that many of the member NFDA companies "still rely on paper maps from every day manual determinations, to digitizing them for automatic determinations, to manual determinations when they are close to the line, to back-up when the digital data does not arrive on time".

In a separate meeting presentation[14] the NFDA strongly encouraged FEMA to address the following areas prior to the transition to all-digital flood map delivery:

- Improve digital data distribution, subscription services and notification of digital data availability through the Digital Post Office (DPO)
- Reduce content and technical differences between data types
- Provide guidance related to map interpretation and digital data policy
- Consider potential issues with the National Flood Hazard Layer

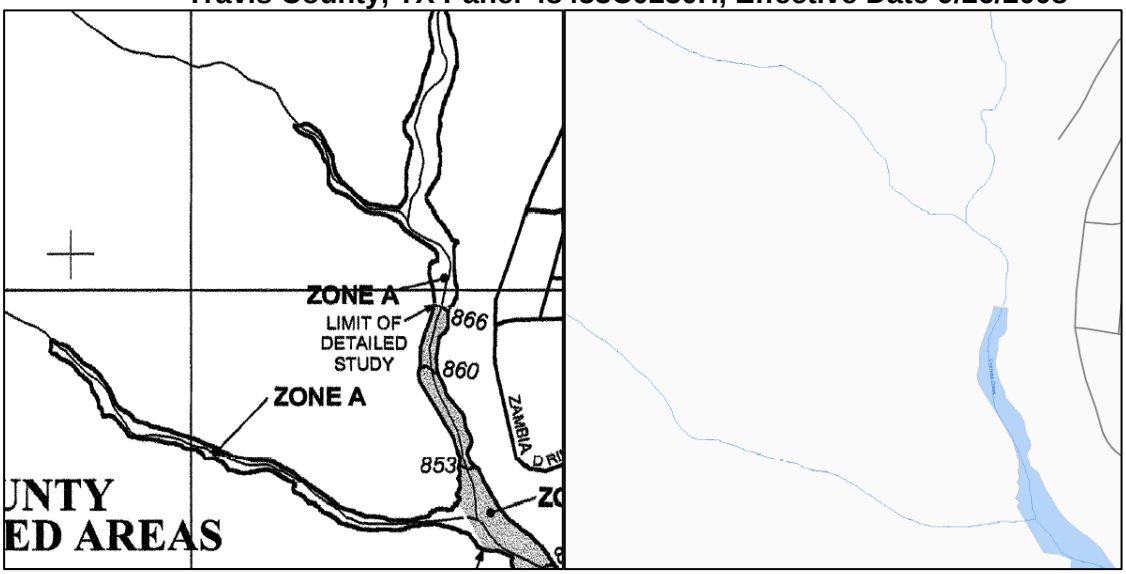
Since the NFDA concerns have already been shared with FEMA only the NFDA concerns that are similar with ASFPM stakeholder concerns are shown below. The NFDA found that:

- There are different release dates for paper FIRMs, FIRMScans, and DFIRM data

[14] Attachment 5 – National Flood Determination Association – "Mapping Coordination, Pre-Meeting Topic Discussion", June 4, 2009

- DFIRM & FIRM Scans are frequently received less than 30 days prior to the effective date or even after the effective date
- There is no centrally published release schedule for each data type
- There is no notification of data being released post-effective date
- There are many examples of content & technical differences in which:
    - features are present in one data type but are missing in the other
    - there are inconsistencies between flood map products - identified in the NFDA presentation for Travis County, TX (see comparison below)

Travis County, TX Panel 48453C0230H, Effective Date 9/26/2008



DFIRM & FIRM Scan Overlay DFIRM

In the ASFPM survey and interviews as well as the NFDA survey and presentation, there are stakeholders that are simply concerned about obtaining data in a timely fashion. Digital data distribution needs to coincide with the distribution of paper maps. When the digital data is delivered after the effective date and after the paper maps are delivered, those entities that use only digital data will be potentially using out-of-date or incorrect information.

There is additional concern about possible confusion between digital data that includes updates based on Letter of Map Revisions (LOMRs) and those that do not. The National Flood Hazard Layer (NFHL) dataset contains LOMR updates and products like the FIRM Scans do not. While this is not a new issue – different versions of paper maps with and without LOMR updates also existed – the broader distribution of datasets like the NFHL via the web expands the user community and thus the potential for misuse due to a lack of knowledge about the data. In the past, when communities were the most likely distributor and source of updated flood hazard maps, any potential map request was made at the source of the updates.

Finally, with regards to LOMR updates, a versioned database or attribute field would allow stakeholders to view the known flood hazard boundaries at any point in time. Basically, any flood boundary line that is updated (added, moved, deleted, modified etc.) would have a time stamp associated with it based on LOMR documentation. The database could then be used to view the history of boundary updates – a helpful option in situations related to Grandfathering or other time sensitive issues.

4.0 Summary and Recommendations

4.1 Summary of Survey and Interviews

Considering the results of the web-based survey, interviews and FEMA metrics, the digital transition is progressing positively in terms of cost reduction and increased use of MSC digital data and products. The survey shows that almost all respondents have access to computers and the Internet. With regards to the use of FEMA's MSC products and tools:

- About 73% have used FEMA's digital data products
- About 77% have used FEMA's digital tools
- About 55% liked using the MSC website
- About 85% of respondents that have used the MSC Website found what they were seeking
- Most thought the performance was acceptable
- Roughly 25% say they always or only use paper

But access to a computer and the internet does not address: the quality and capabilities of the available computers and any installed software; whether they are available full-time to the floodplain manager; what the internet bandwidth is or if the computers are available for public use for mapping requests. Additionally, 25% of web survey respondents are still not using the digital data products and tools provided by FEMA with approximately 36% responding that they have not used the MSC Website to find data products or tools. Stakeholders can receive DFIRMs delivered on CD/DVD from FEMA without accessing the MSC website, which would account for the difference in the number of respondents that are not using digital data and products (25%) vs. those that have not accessed the MSC website (36%).

Many worry about always having access to the flood hazard information – for example in emergency response situations with short notice and power outages. More than 50% of respondents are concerned about having access to large format plotters that are needed for full-size FIRMs. Most users still use paper in some function for a wide range of purposes. Seventy-five percent need paper for activities ranging from training to public meetings to field use. Most keep more than one map copy. Many people plan to continue using the paper maps, but are concerned about the availability of paper maps when the maps cannot be obtained from FEMA. Many at the state government level are worried about being overwhelmed with map requests from smaller organizations.

Many of the stakeholders were simply concerned about obtaining data in a timely fashion – this was also reflected in the National Flood Determination Association survey and presentation. There is also still confusion whether digital is official and whether some products produce official maps and others do not. There definitely is confusion on whether GIS data are official.

The MSC tools are useful but there is confusion over which product to use for various tasks. This may be due to the fact that there are very similar products that function very differently and with very different looks. For a better understanding of issues related to the use of MSC digital data, products and tools see *Attachment 2 – Evaluation of MSC Digital Products and Tools*.

The survey and interviews indicate that all users would like more information. Webinars, classroom training, task based how-to instructions, a help-line, and an on-line discussion forum. There are still users without access to the Internet, so it will also be important to have information sent to all users by mail.

4.2 Concerns and Issues

As put forth in the introduction, the general concern related to the limited distribution policy can be characterized by its unknown impact specifically to floodplain management activities and therefore on the National Flood Insurance Program (NFIP). The policy may have an adverse impact on overall floodplain management by discouraging participation in the NFIP or it may result in a less effective local program. These impacts may come about as a result of:

- The cost and workload required at state or local level to support paper map users
- Smaller communities without the capabilities to utilize digital products or tools of any kind due to:
    - Lack of modern computer hardware, software, printers (including plotters) or internet connection that can install and utilize data intensive digital products, even if provided as a PDF
    - Lack of trained personal on latest computers or software
    - Lack of publically accessible computer monitors for viewing digital only
- State and locals that for the most part do not have the capabilities to take on the role of the FEMA map warehouse function to support paper map users
- Communities that may not realize that they have a flood map, especially with staff turn over, if the paper map is not present
- Communities in which building officials have many roles in addition to being the floodplain administrator. These officials know how to read and interpret a paper map and often do not have a comfort level with computers

Specific concerns and questions that stakeholders have are:

- Where will stakeholders and communities go to get paper maps once FEMA ends distribution? Who will pay for these printing costs?
- Who will fund or will funding be available to help transition to digital data products and tools?
- Are all distributed flood map products consistent with regards to content?

4.3 Recommendations

There is certainly more that can be done to help with the digital transition. Thirty percent of the country is not covered by digital data and users in these areas are not sure what will happen to them. Better communication, training, and education will be vital to a successful transition – FEMA should be communicating its plans to support stakeholders before and after the limited distribution policy takes effect. It is paramount that the flood hazard data, products and tools provide full accessibility to complete and accurate flood hazard information so users can successfully complete their jobs regardless of their digital capabilities. For available digital flood hazard products and tools it is critical that everyone understands what is in the data and how the data are to be used or not used. Most importantly, users need to be confident that the data can be trusted.

The Digital Transition is moving in a positive direction based on the results of the survey and interviews presented in this report along with FEMA's own metrics for Map Modernization. Cost savings and benefits have already been realized and will continue as more communities, businesses and stakeholders develop the capacity and capabilities to utilize digital data products and tools.

Many stakeholders already have and many more will have the capabilities to transition to digital data and products. Those that are transitioning and are willing to go completely digital will benefit from a gradual transition as it would lessen the financial impact and allow them to fully convert their systems and train their staff. However, there will always be communities and stakeholders that will need paper maps and absent solutions to provide printed maps for these communities and stakeholders, the digital transition would still continue successfully even if placed on a gradual implementation timeline.

Recommendations for each of the specific concerns/questions presented in the previous section are:

- *Where will stakeholders and communities go to get paper maps once FEMA ends distribution? Who will pay for these printing costs?*

  FEMA has told stakeholders to be ready for all digital distribution, so for printing needs FEMA should provide assistance by establishing printing resources, be it a private company with Print-On-Demand capabilities or local or state government agencies with these capabilities and their pledged cooperation. FEMA funds should also be provided for printing and distribution costs.

- *Who will fund or will funding be available to help transition to digital data products and tools?*

  Stakeholders expressed concern that FEMA was passing along the costs of printing to States and locals. FEMA could alleviate this concern by instituting a funding mechanism that would pay for printing as needed (see previous) and aid in the transition to digital products and tools.

- *Are all distributed flood map products consistent with regards to content?*

  Differences between FIRM Scans and DFIRMs have been presented along with known differences in the NFHL due to LOMR updates. All digital data distribution needs to coincide – DFIRMs, FIRMScans, and Paper Maps all need to be released at same time based on the effective data shown on the map. For public notice and NFDA purposes this needs to be 30 days prior to Effective Date. FEMA needs to be at a point where it is consistently delivering a quality digital product for all maps and on a timely basis.

  With regards to the LOMR updates, automatic notification of map updates via a subscription service to stakeholders would provide a mechanism for keeping data synchronized. It is also recommended that FEMA explore database or attribute versioning. A versioned database or attribute field would allow stakeholders to view flood hazard boundaries and LOMR updates at any point in time.

To summarize, until such a time that FEMA can provide stakeholders with resources for paper map requests or the capacity to utilize MSC digital tools and products, FEMA should provide at least one of the following resources:

1. Support paper map requests through a Print-on-Demand service from the Map Service Center. FEMA should provide exemptions to the limited distribution policy for NFIP community stakeholders – or State and local agencies that support these communities – that need more than one copy of the paper maps.

2. Establish and make available to stakeholders a list of currently known private vendors or public agencies that have qualified Print-On-Demand services and/or capabilities to support paper map requests with fee exemption for NFIP communities. This would provide communities with a place to request printed maps.

Moving forward, FEMA should:

3. Provide funding mechanisms, guidelines and logistical support to establish Print-on-Demand services. Funding options would enable private companies and public agencies to provide print services – for States and communities this could be accomplished through Community Assistance Program (CAP) or Cooperating Technical Partner (CTP) channels. Guidelines and logistical support would ensure consistent map production and printing standards along with direct access to digital flood hazard map products. Guidelines would also facilitate the process of helping private vendors or public agencies get established as a qualified Print-on-Demand service provider – essentially these service providers would have MSC-like capabilities.

4. Provide funding mechanisms that would help establish digital capacity for States and communities. This would provide the community with a minimum technical capacity to view and print maps as needed. Again for States and communities this could be accomplished through Community Assistance Program (CAP) or Cooperating Technical Partner (CTP) channels.

Below are additional items that can be addressed to aid in the transition. This is not a complete list and in order to achieve success, it is recommended that FEMA continue to listen to the users with respect to what works and what needs improvement.

Education/Training

- Education about transition; there is still a great deal of confusion
- Education explicitly on digital data
- Free training utilizing a variety of applications (Webinars, classroom, PDFs to download)
- Establish a 1-800 hotline for help
- On-line user discussion forum available on the MSC site
- How-to lessons on several commonly performed tasks

MSC Tools

- Create a quick launch for all tools in the same easy-to-find location on the front page of the MSC.
- Provide clear and easy-to-find computer system requirements for tools and products.

- Offer explanations and examples of best uses and intended uses for each digital product or tool.
- Standardize functionality for all similar products to reduce confusion with products such as FIRMette Web and Desktop tools. A Desktop version could potentially have more tools but those tools that are the same should look, function, and display the same. The interface should look generally the same.
- Provide more tools with high-end functionality such as the “e-z print” button found on the MapViewer – Web tool. The “e-z print” button allows the user to select a location and then creates a map and report within a standardized cartographic template.
- Increase the speed of the FIRMette Web and Desktop tools.
- Add instructions on how to create and add custom .kmz files to Google Earth.
- Review the cartographic elements in all products. Examples would be that the label points do not need to be shown when they are used only to label a body of water or in the case of the Map Viewer, there are duplicate layers.
- Modify and/or review layer display characteristics – the current display of orthophotos obscures most other information in the various viewers with the exception of Google Earth.
- Support large format printing and/or exporting - none of the MSC tools allow for a large format export or print. This needs to be remedied.

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Appendices and Attachments

Appendix A - ASFPM Digital Flood Map Transition Survey Questions

01. What Industry do you serve? (Please check one)
- O Federal Government
- O State Government
- O Regional Government
- O Local Government
- O Insurance
- O Banking
- O Real Estate
- O Academia
- O Engineer/Surveyor
- O Other (please specify) _____

02. What is your Primary Job? (Please check one)
- O Permit Official
- O Planner
- O Floodplain Administrator
- O Building Official
- O Emergency Manager
- O Other (please specify) _____

03. How do you use FEMA Flood Insurance Rate Maps (FIRM)? (Check all that apply)
- O Data/maps user
- O Map/data admin/distributor
- O Data/map creator
- O Other (please specify) _____

04. What size community do you serve? (Please check one)
- O Less than 10,000
- O 10,000 to 50,000
- O 50,000 to 100,000
- O 100,000 to 500,000
- O 500,000 to 1 million
- O Greater than 1 million
- O State-wide
- O Work for a private organization

05. Are you comfortable using FEMA digital Flood Hazard Data or Tools to print maps?
- O Very Comfortable
- O Comfortable
- O Uncomfortable
- O Very Uncomfortable
- O Have not used

06. If Flood Insurance Rate Maps (FIRM) are only available in digital form, what, if any, additional cost do you expect to incur from implementing printing of maps? (Please enter a number without a comma or $)
Start up in first year? (Plotters, software) _____
Annually? (Paper, ink, contracting) _____

07. Select the FEMA Digital Flood Hazard Product or Tool you use. (Check all that apply)
- O FIRM Scans
- O Digital Flood Insurance Rate Map (DFIRM) database
- O National Flood Hazard Layer Statewide GIS datasets (NFHL)
- O NFHL Web Map
- O None of the above

08. Select FEMA Tools you have used. (Check all that apply)
- O FIRMette-Desktop (F-MIT)
- O FIRMette-Web
- O MapViewer-Desktop
- O MapViewer-Web
- O NFHL Google Earth utility (kmz) files
- O None of the above

09. Can you access the FEMA Digital Flood Insurance Study (FIS) report file?
- O Yes
- O No

10. Could you find a FEMA Digital Flood Hazard Tool or Product you were looking for on FEMA's Map Service Center (MSC) Web site?
- O Yes
- O No
- O Have not used

If no, what were you looking for? _____

11. How fast did the FEMA Map Service Center (MSC) Web site perform?
- O Very Fast
- O Fast
- O Moderate
- O Slow
- O Very Slow
- O Have not used

12. There were clear instructions to use the FEMA Digital Flood Hazard Data and Tools you have utilized.
- O Strongly Agree
- O Agree
- O Disagree
- O Strongly Disagree
- O Have not used

13. Please rate the experience you have using FEMA Digital Flood Hazard Data and Tools?
- O Very Good
- O Good
- O Poor
- O Very Poor
- O Have not used
- O Indifferent

14. Please rate your overall experience on the FEMA Maps Service Center (MSC) Web site?
- O Very Good
- O Good
- O Poor
- O Very Poor
- O Have not used
- O Indifferent

15. When can't you use the FEMA Digital Maps and Tools or a print from it?
- O Always use Paper Maps
- O Public Meetings
- O Planning
- O Citizen request copy
- O Use in Field
- O Emergency
- O Other (please specify) _____

16. How do you currently provide citizens and others with FEMA Flood Maps when requested?
- O Photocopy
- O Print a new copy
- O Direct people to FEMA Web site
- O Request from FEMA
- O Don't provide them
- O Other (please specify) _____

17. What items, if any, do you need to work with FEMA digital data that you do not currently have? (Check all that Apply)

- O Software
- O Computers
- O Printers or Plotters
- O High-speed Internet
- O New Staff
- O Training
- O Other (please specify) _____

18. How does your organization use the FEMA flood maps? (Check all that apply)

- O Digital only
- O Paper only
- O Digital and paper

19. What different uses do you have for the FEMA maps? (Check all that apply)

- O Land-use planning
- O Zoning
- O Emergency Management
- O Mitigation
- O Building/Development
- O Insurance
- O Other (please specify) _____

20. Will you use current FEMA Digital Maps and Products to view and print FEMA Flood Maps?

- O Yes
- O No

21. Would you face any obstacles if the FEMA paper maps were no longer available from FEMA? Please explain.

_____
_____
_____
_____

22. Do you have access to computers in your office?

- O Yes
- O No

23. Do you have High Speed Internet in your office? (e.g. DSL, Cable, T1, T3)

- O Yes
- O No

24. Do you feel you have computer technical support available that is needed in your office for using FEMA Digital data/maps?

- O Yes
- O No

25. Are you comfortable with the Geographic Information Systems (GIS) capabilities in your office?

- O Very Comfortable
- O Comfortable
- O Uncomfortable
- O Very Uncomfortable
- O Do not have capabilities

26. How many GIS staff do you have in your office?

- O 0
- O 1
- O 2
- O 3 - 4
- O 5 or more

27. Are there plans for establishing or increasing GIS capabilities in the office?

- O Yes, Establishing
- O Yes, Increasing
- O No
- O Already have what is needed

28. In what formats can you print? (Check all that apply)

- O 8.5x11 (Color)
- O 8.5x14 (Color)
- O 17x11 (Color)
- O Greater than 36x40 (Color)

- O 8.5x11 (Black & White)
- O 8.5x14 (Black & White)
- O 17x11 (Black & White)
- O Greater than 36x40 (Black & White)
- O Other (please specify) _____

29. Do you need more than one full copy of most printed flood maps?

- O Yes
- O No
- O Only in emergency
- O Do not need paper maps

30. If paper maps were no longer available from the FEMA MSC, from where would you anticipate getting your paper FEMA maps from? (Please check one)

- O State
- O County
- O City
- O Other (please specify) _____
- O Regional Authority
- O Print in-house

31. Do you think the FEMA Digital Transition will have a positive or negative impact on you?

- O Strongly Positive
- O Positive
- O Indifferent
- O Negative
- O Strongly Negative

Appendix B – ASFPM**/**FEMA Stakeholder Interview Questions Guide

1. Tell us how your organization uses the FEMA Flood Insurance Rate Maps (FIRMs)?

Interviewer – if help is needed answering the question, give an example such as:

- *Public Meetings*
- *Zoning*
- *Emergency Management*
- *Mitigation Plan*
- *Building/development*
- *Flood determination*

When a map is needed for any of the above, are the standard FEMA FIRM (large format 36" x 26") **needed, or would you produce or could you use a customized map at a different scale or page size with other information?**

Interviewer – if help is needed, prompt using examples below:

- *Custom map showing town-wide view*
- *8.5x11 map showing a single property*
- *11x17 color print with orthophoto for neighborhood*

2. What is the approximate number of citizens / customers served?

Interviewer –

If a public agency, then ask for approximate number of citizens or size of community:

- *Less than 5,000*
- *50,000 – 100,000*
- *State-wide*

If a private organization, then ask for:

- *Number of customers and/or communities served*

3. Are one or more full sets of paper maps maintained? How many and why?

4. Are any FEMA Map Service Center (MSC) digital tools and products being used?

If No (not a digital user):

5A. Is the user aware of the FEMA digital flood hazard mapping tools and products?

Interviewer – if help is needed, prompt using list below:

- *FIRM Scans*
- *Digital Flood Insurance Rate Map (DFIRM) database*
- *National Flood Hazard Layer Statewide GIS datasets (NFHL)*
- *NFHL Web Map Service*
- *FIRMette-Desktop (F-MIT)*
- *FIRMette-Web*
- *MapViewer-Desktop*
- *MapViewer-Web*
- *NFHL Google Earth utility (kmz) files*
- *FEMA Digital Flood Insurance Study (FIS) report file*

6A. If digital maps are never used – why not? What is needed to change this?

Interviewer – follow-up examples:

- *Internet access, higher speed Internet*
- *Computer, better computer*
- *Staff, more help, someone else to do it*
- *Training*

- *More time, money, support, resources (how & why?)*
- *Printing equipment / plotter*
- *More computer literate customers / citizens*
- *FEMA permits purchase of as many paper copies needed when maps are issued / changed*

7A. Are there any other obstacles faced related to transitioning to digital maps?

- *Organizational policies*
- *Space or location for publicly accessible computer, printer, or kiosk*
- *Legal issues*

If Yes (digital user):

5B. Which have been used? How do are they used?

Interviewer – if help is needed, prompt using list below:

- *FIRM Scans*
- *Digital Flood Insurance Rate Map (DFIRM) database*
- *National Flood Hazard Layer Statewide GIS datasets (NFHL)*
- *NFHL Web Map Service*
- *FIRMette-Desktop (F-MIT)*
- *FIRMette-Web*
- *MapViewer-Desktop*
- *MapViewer-Web*
- *NFHL Google Earth utility (kmz) files*
- *FEMA Digital Flood Insurance Study (FIS) report file*

6B. Describe your familiarity and experience with FEMA's digital products?

Expert

- *Intermediate*
- *Beginner*

7B. When can digital maps NOT be used?
How often does this occur?

8. If training or educational tools for the FEMA MSC Tools and Data were available, would this be used? Would more training be useful?

If so, what method would be most useful? Why?

- *Download a PDF, receive a mailing, on-line instructions, on-line classes, Webinar, Classroom exercises*

9. If paper maps cannot be received from the MSC, where would the maps be obtained? Why?

Interviewer – if help is needed, prompt using list:

- *State*
- *County*
- *Regional Authority*
- *Print-on-demand Service – a phone number or Web site that would allow paper map orders*

10. What else should FEMA know about the digital transition and/or the limited distribution of paper maps?

Attachment 1 – FEMA Moving to Digital Fact Sheet

Attachment 2 – Evaluation of FEMA MSC Digital Products and Tools

Attachment 3 – ASFPM Digital Transition Web Survey Results

Attachment 4 – NFDA Digital Survey Summary

Attachment 5 – NFDA Mapping Coordination Presentation, 6/4/2009