



Risk MAP and Non-Regulatory Products Introduction

By Andy Read, Program Specialist, FEMA

RiskMAP
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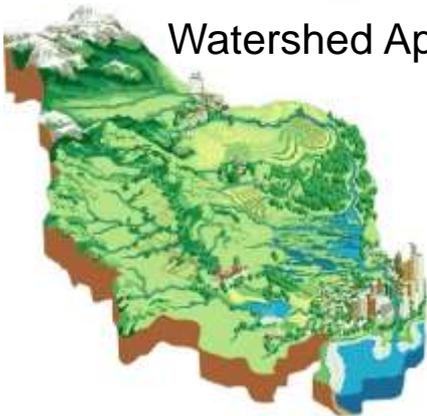
Risk MAP

(Mapping, Assessment, Planning)

Through collaboration with State, Local, and Tribal entities, Risk MAP will deliver **quality data** that increases **public awareness** and leads to **action that reduces risk** to life and property



Watershed Approach



Science-based risk data to support decision-making



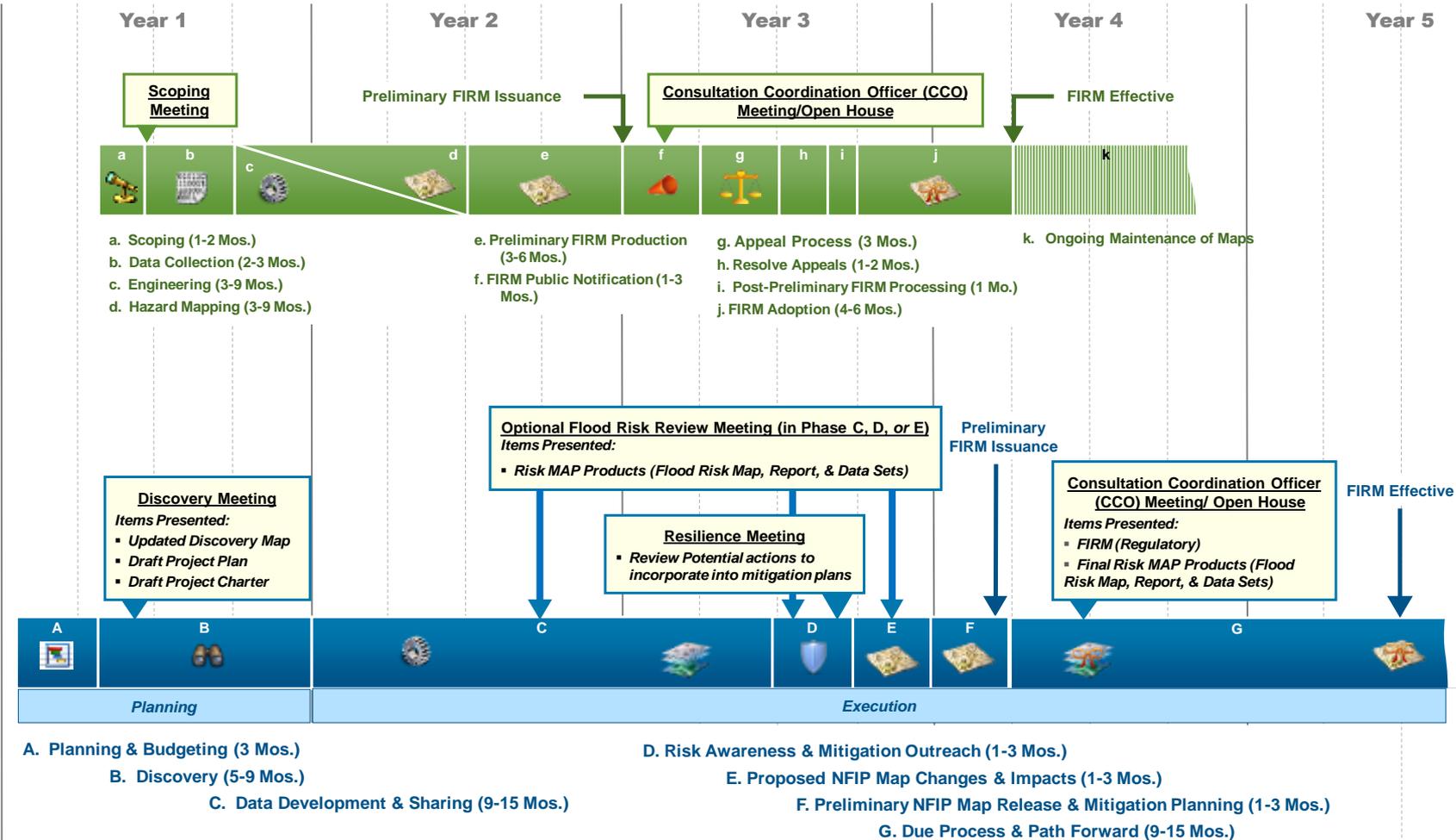
Risk MAP is a Portfolio Of Programs:

- NFIP Mapping
- Dam Safety
- Mitigation Planning
- Hazus

Map Modernization and Risk MAP Project Timelines

Map Modernization
2 - 3 years

Risk MAP
3 - 5 years



Updated 12/8/10

Risk MAP Goals

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Goals

Deliver High-Quality Risk Data



Products

- Understandable Flood Maps
- Credible data—reliable, accurate, watershed-based
- Illustrations of possible Flood Depths
- Usable Flood Risk Assessments

Increase Awareness of Flood Risk



- Tools to understand how flood risk has changed
- Continuous engagement with communities
- Enable communities to communicate flood risk to constituents

Promote Community Mitigation Action



- Support that allows communities to identify risks and promote:
- Community resiliency
- Sustainability
- Reduced need for federal disaster assistance

MITIGATION PLANNING

Processes



Enhance delivery of Risk MAP Products



Collaborate across all levels of government

Reduce Risk to Lives and Property



Risk MAP Program Measures

Quality Data

Percentage of mapped miles based on **New, Validated, or Updated Engineering (NVUE)** through Risk MAP review and update process

Deployment

Percentage of population where Risk MAP has been **deployed**

Awareness

Percentage of local officials with **flood risk awareness** in Risk MAP communities

Action

Percentage of population where Risk MAP has led to **identifying and taking action** to reduce flood risk

<http://RiskMAPProgress.msc.fema.gov/>

Risk MAP Non-Regulatory Products Agenda

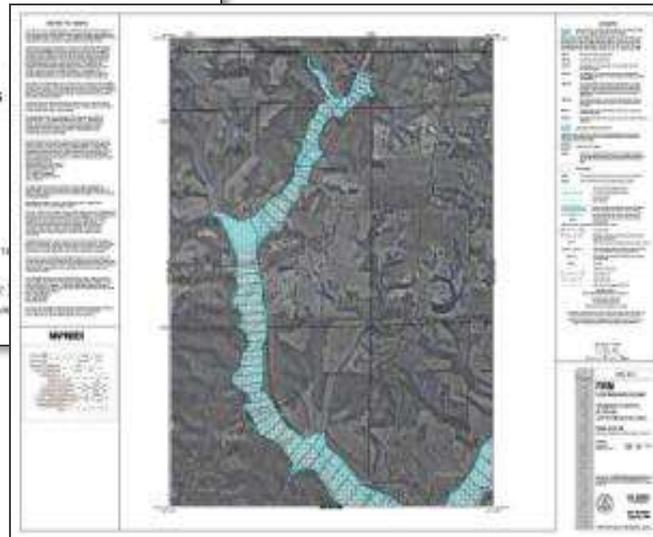
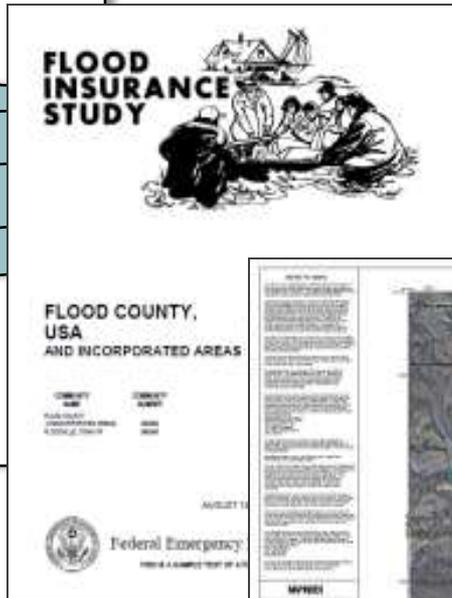
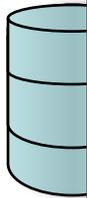
- **Background**
- **Overview of Risk MAP Data Sets**
 - Changes Since Last FIRM
 - Flood Depth and Analysis Grids
 - Flood Risk Assessment
 - Areas of Mitigation Interest
- **Overview of Risk MAP Products**
 - Flood Risk Database
 - Flood Risk Report
 - Flood Risk Map

Program Product Comparisons

Traditional Regulatory Products

DFIRM Database

- Flood_Hazard_Data
- Political_Boundaries
- Public_Land_Survey_System
- TopoData
- Community_Panel_Info
- L_Comm_Info
- L_MT1_OMC
- L_Pan_Revis
- L_Pol_FHRM
- L_Riv_Model
- L_Stn_Start
- L_Wtr_Nm
- s_Bfe
- s_DOQ_Index
- s_Firm_Pan
- s_Gen_Struct
- s_Label_Id
- s_Label_Pt
- s_LOMR
- s_Perm_Bnk
- s_Quad
- s_Riv_Mrk
- s_Transport_Ar



Program Product Comparisons

Non-Regulatory Flood Risk Products

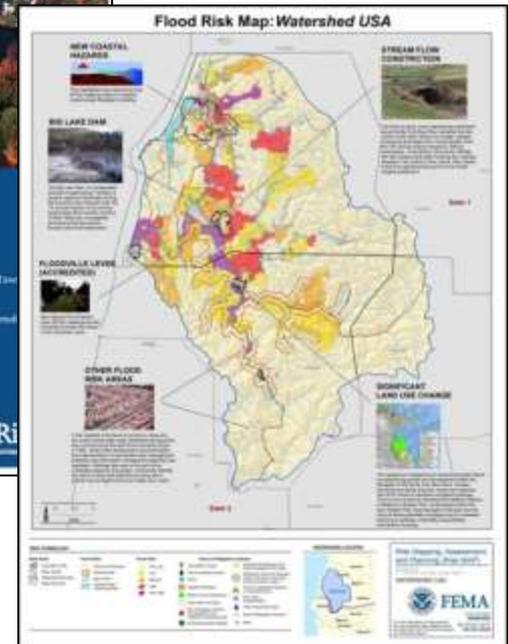
DFIRM Database

- Flood_Hazard_Data
- Political_Boundaries
- Public_Land_Survey_System
- TopoData
- Community_Panel_Info
- L_Comm_Info
- L_MT1_OMC
- L_Pan_Revis
- L_Pol_FHBM
- L_Riv_Model
- L_Stn_Start
- L_Wtr_Nm
- S_Bfe
- S_DOQ_Index
- S_Firm_Pan
- S_Gen_Struct
- S_Label_Ld
- S_Label_Pt
- S_LOMR
- S_Perm_Bnk
- S_Quad
- S_Riv_Mrk
- S_Transport_Ar



Flood Risk Database (FRD)

- Community_Panel_Info
- L_Comm_Info
- L_MT1_OMC
- L_Pan_Revis
- L_Pol_FHBM
- L_Stn_Model
- L_Stn_Start
- L_Wtr_Nm
- S_Bfe
- S_DOQ_Index
- S_Firm_Pan
- S_Gen_Struct
- S_Label_Ld
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- S_Transport_Ar



Flood Risk Products and Datasets

Three Flood Risk Products

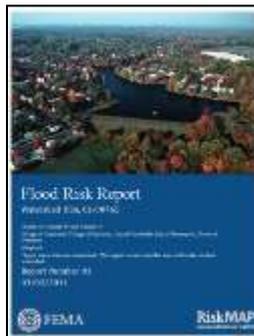
- Flood Risk Database
- Flood Risk Report
- Flood Risk Map

Four Flood Risk Datasets

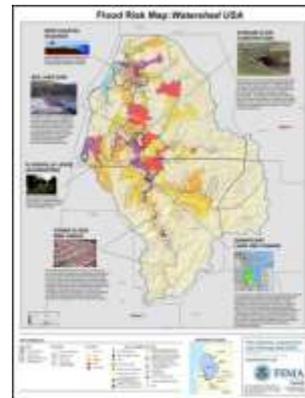
- Flood Depth & Analysis Grids
- Flood Risk Assessments
- Changes Since Last FIRM
- Areas of Mitigation Interest



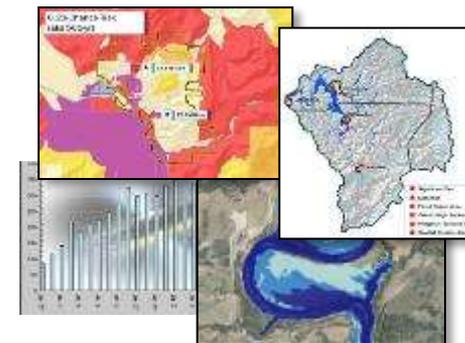
Flood Risk Database



Flood Risk Report



Flood Risk Map



Flood Risk Datasets

Base vs. Enhanced Flood Risk Datasets

- All projects include the 3 products (database, report and map)
- **Base Flood Risk Datasets**
 - Changes Since Last FIRM
 - Depth and Analysis Grids
 - Flood Risk Assessments
 - Areas of Mitigation Interest
- **Enhanced Flood Risk Datasets**
 - Others – Primary Frontal Dune Erosion Grid, Vertical Changes by WSE Increments, etc.



Flood Risk Datasets

- Changes Since Last FIRM
- Flood Depth & Analysis Grids
- Flood Risk Assessment
- Areas of Mitigation Interest

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Changes Since Last FIRM Dataset

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Purpose of Changes Since Last FIRM

- **Identify Areas and Types of Flood Zone Change:**
 - Compares current effective (previous) with proposed (new) flood hazard mapping. (all inputs must be digital)
 - Flood zone changes are categorized and quantified
- **Provide Study/Reach Level Rationale for Changes Including:**
 - Methodology and assumptions
 - Changes of model inputs or parameters (aka Contributing Engineering Factors)
- **Offer Stakeholders Transparency and Answers to:**
 - Where have my flood hazards increased or decreased?
 - Why have my flood hazards increased or decreased?
 - Which communities are subject to new BFEs or ordinance adjustments.

Changes Since Last FIRM





Flood Depth & Analysis Grids

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Purpose of Flood Depth & Analysis Grids

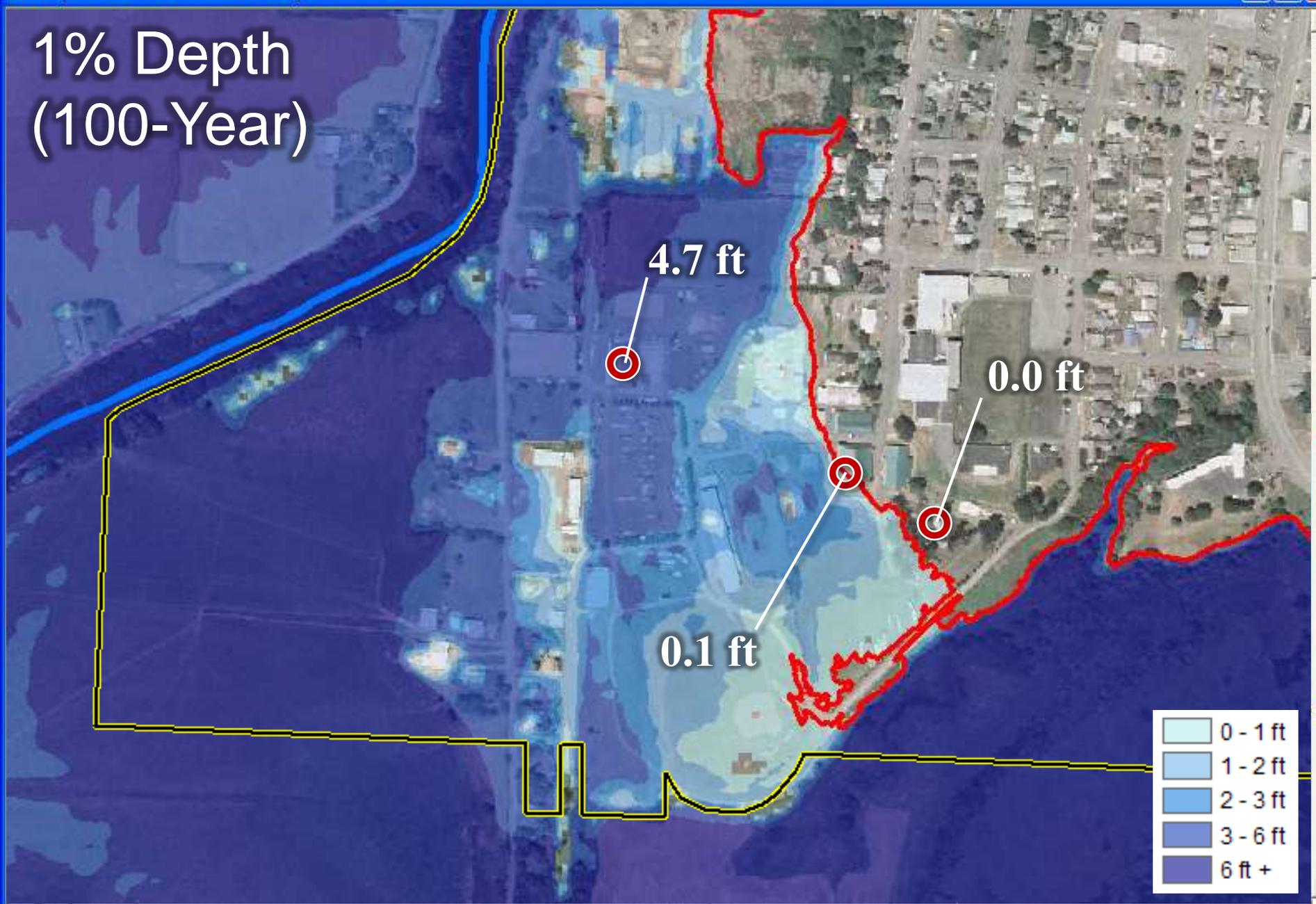
- Communicate / ‘Show’ Flood Inundation as Function of Event’s Magnitude or Severity
- Serve as Key Inputs to Hazus Risk Assessment Analyses
- Serve as pre-screening criteria for mitigation project potential (e.g. BCA > 1.0 with positive 10-yr depths)
- Increase Flood Risk Awareness as Acknowledged from Varied Contexts (Depth, Probability, Velocity, etc.)
- Communicate that hazard, and by extension risk, varies within the mapped floodplain

Flood Depth and Analysis Grids

- Grids include:

- Flood Depths for Standard and Enhanced Frequencies (incl 1%-plus)
- Water Surface Elevation for Standard and Enhanced Frequencies
- Water Surface Elevation Change Since Last FIRM (1%)
- Percent Annual and 30-yr Percent Chance of Flooding
- Velocity
- Hillshade

1% Depth (100-Year)



4.7 ft

0.0 ft

0.1 ft

Lightest Blue	0 - 1 ft
Light Blue	1 - 2 ft
Medium Blue	2 - 3 ft
Dark Blue	3 - 6 ft
Darkest Blue	6 ft +



Flood Risk Assessment Data

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Flood Risk Assessment Data Purpose and Intended Uses

- **Identify Areas and Communicate Relative Flood Risk:**
 - Flood prone areas
 - Vulnerable people and property
- **Provide Flood Risk \$:**
 - Potential damage severity for different flood frequencies
 - Identify locations with possible cost effective mitigation options
- **Improve Estimates for Flood Risk \$:**
 - Losses from Average Annualized Loss (AAL) Study
 - Refined losses from new flood study depth grids
 - Refined general building stock data from local sources

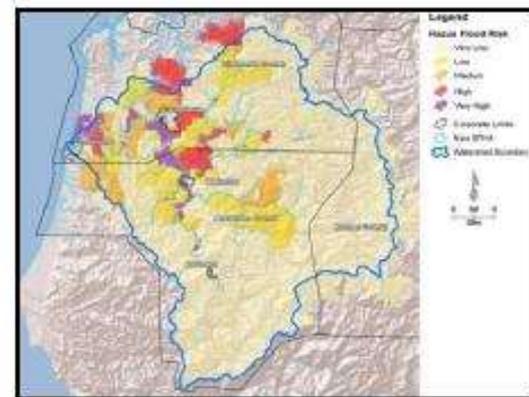
Flood Risk Assessment Datasets

■ Flood Risk Assessment Data

- 2010 Hazus Average Annualized Loss (AAL) Study Data
- Refined Hazus and Other Risk Analyses Data
- Composite Data

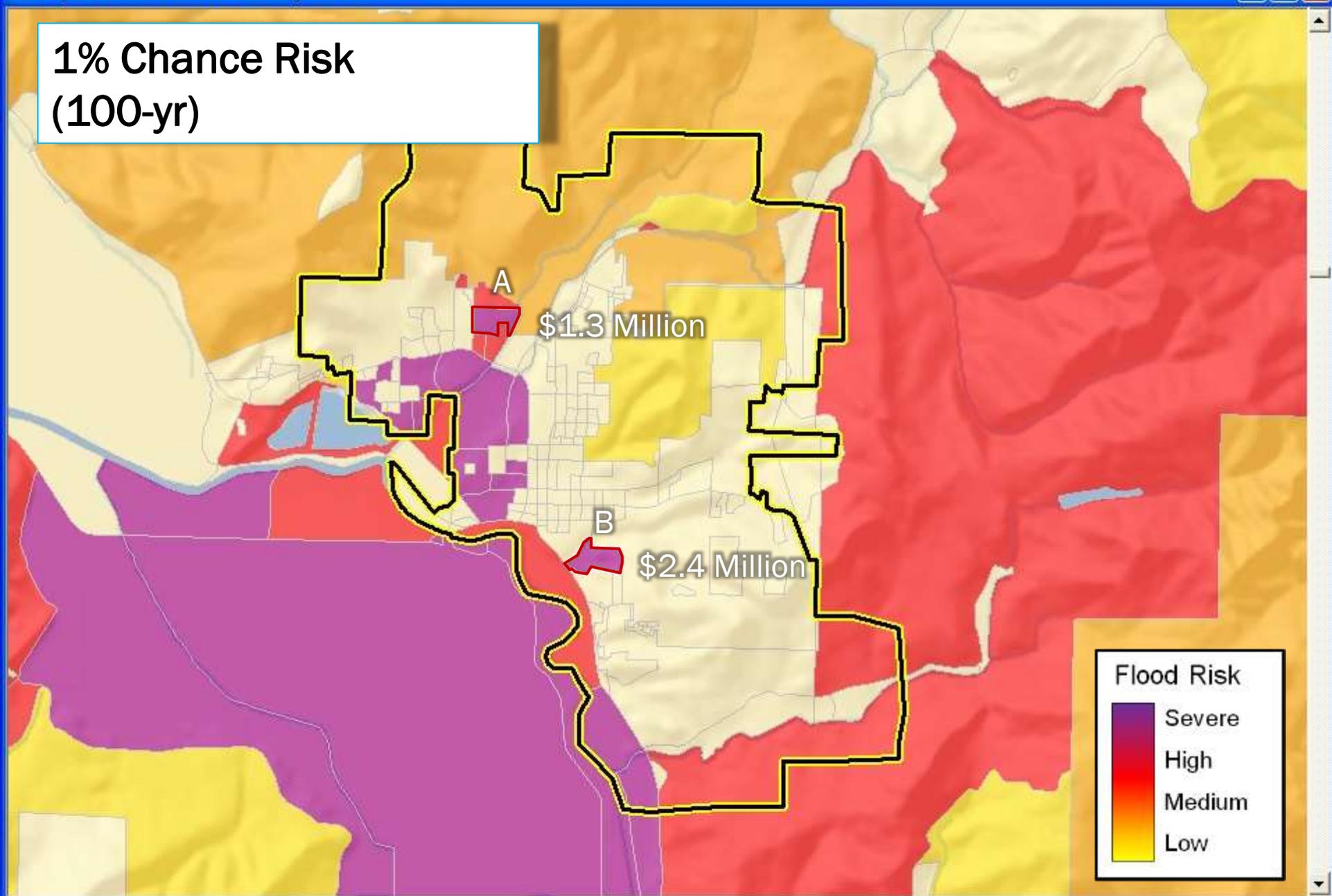


Hazus



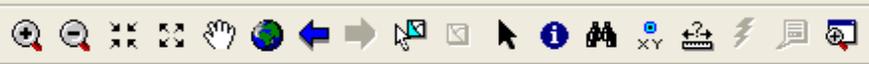
Flood Risk Assessment

1% Chance Risk (100-yr)

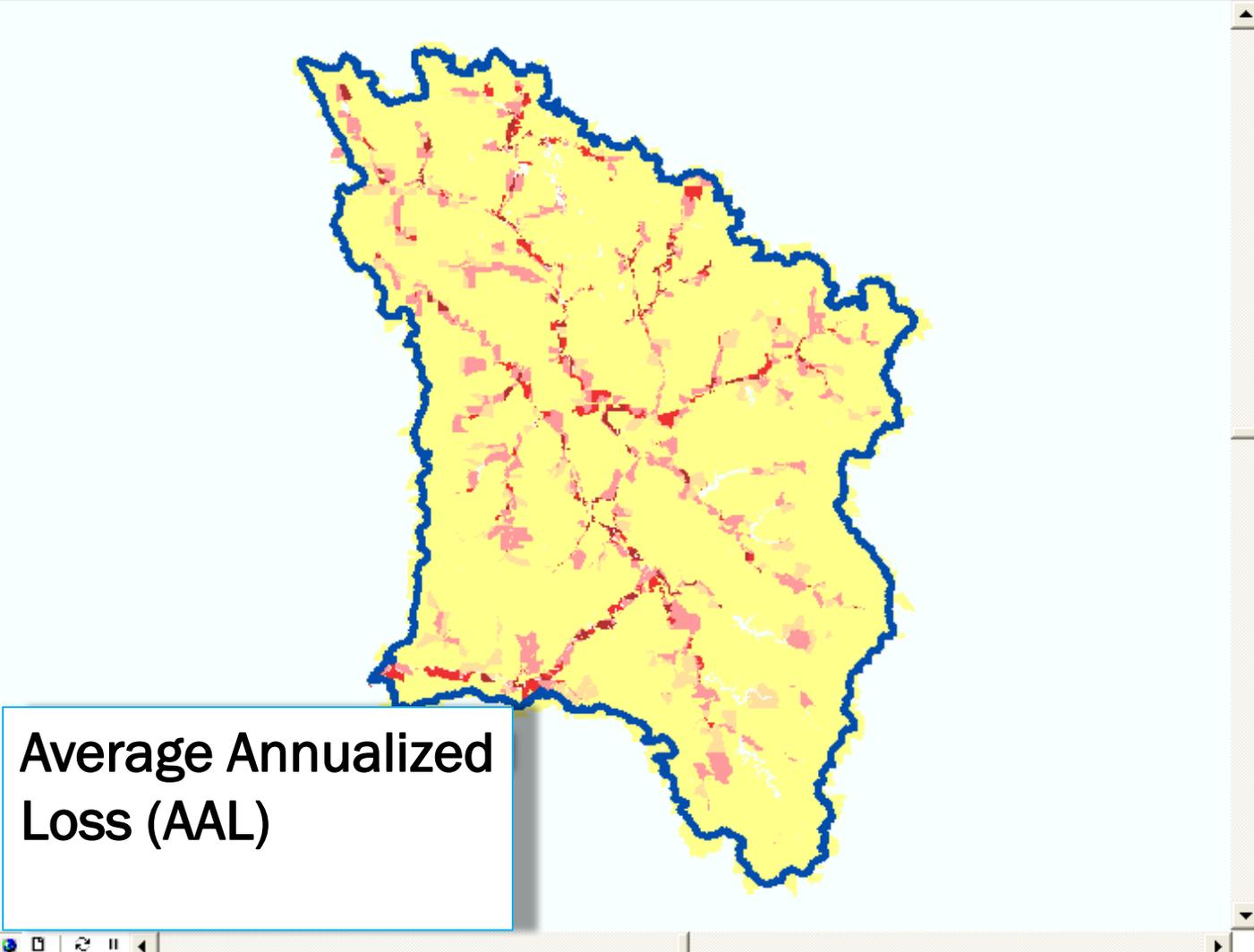


Flood Risk

- Severe
- High
- Medium
- Low



- wse_change
- Prelim/Effective Flood Hazard A...
- Q3_Stark_Floodplain
- Political Areas
 - Municipal Boundaries
 - Counties
- Watershed Boundary
- CNMS Data
- Topo_Inventory
- Imagery
- Basemap_Data
- Watershed_AAL
 - Wght_Loss
 - Very Low
 - Low
 - Medium
 - High
 - Very High
- Expiration_Watershed
 - <all other values>
 - Expiration
 -
 - 1/11/2012
 - 2/8/2011
 - 3/1/2010
 - 3/29/2012
 - 4/12/2012
 - 4/9/2012
 - 5/9/2012
 - 6/23/2011





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Areas of Mitigation Interest

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Areas of Mitigation Interest

Purpose and Intended Uses

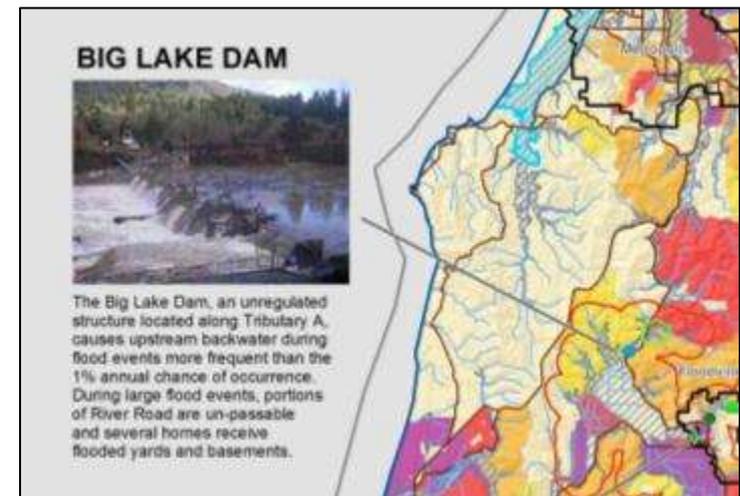
- Identify areas that may be affecting flood risk that would benefit from a raised local awareness
- Raise awareness by local stakeholders of areas within and upstream of the watershed that may be contributing to flood risk and associated interrelationships
- Provide input to local mitigation plans

Overview - Areas of Mitigation Interest

Items that may have an impact (positive or negative) on the identified flood hazards and/or flood risks

Examples include:

- Riverine and coastal flood control structures (e.g., dams, levees, coastal berms, etc.)
- At risk essential facilities and emergency routes that could be overtopped
- Stream flow constrictions (e.g., undersized culverts and bridge openings, etc.)
- Previous assistance and claims “Hot Spots” (clusters of IA and PA claims, RL, SRL)
- Significant land use changes
- Significant riverine or coastal erosion
- Locations of successful mitigation projects





Flood Risk Products

- Flood Risk Database
- Flood Risk Report
- Flood Risk Map

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Flood Risk Database

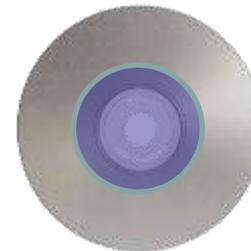
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Purpose of Flood Risk Database



- **Primary Storage Device for:**
 - Flood Risk Data
- **Stores Data to Create:**
 - Flood Risk Report
 - Flood Risk Map
- **Delivered Digitally to Stakeholders**



**Data
Delivered**

Flood Risk Database

Datasets Included (*italics* = enhanced)

■ Changes Since Last FIRM

- Horizontal Changes and Results
- Structure/Population counts impacted by change

■ Depth & Analysis Grids

- Depth (10, 04, 02, 01, 0.2 percent chance)
- Percent Annual Chance
- 30-Year Probability Grid
- Water Surface Elevation (multi-freq)
- Water Surface Elevation Change (1%)
- Velocity Grids
- Multi Freq Grids for Coastal Areas, etc.

■ Flood Risk Assessment

- Average Annualized Loss – 2010
- Refined Flood Risk Assessment
- Hazus or Non-Hazus with improved data/assumptions

■ Areas of Mitigation Interest

- Areas of Mitigation Opportunity or Awareness



Using the Flood Risk Database

- Intended to be used in a GIS
- Real Usefulness of the FRD is in the Data
- Combined with local data
 - Housing
 - Commercial
 - Critical / public infrastructure
- Supports risk analysis, hazard mitigation planning
- Requires GIS capabilities to understand and apply the data to local questions / problems

FRD – Beyond the Report and Map

■ Ad-Hoc Queries and Investigations

- Use Percent Annual Chance and 30-year Chance for Insurance Investigations
- Use CSLF Summaries for Analyzing Increase/Decrease in NFIP Policies Required
- Knowing the Average Annual Losses by Census Block, Identify & Prioritize Areas for Mitigation Activities

■ Combine with Other GIS Datasets

- Use the CSLF Feature Class with Local Building Data to Generate a Mailing List of Buildings Added/Removed from Floodplain
- Use the Depth Grids with Buildings Data in Screening /Prioritizations of Mitigation Projects



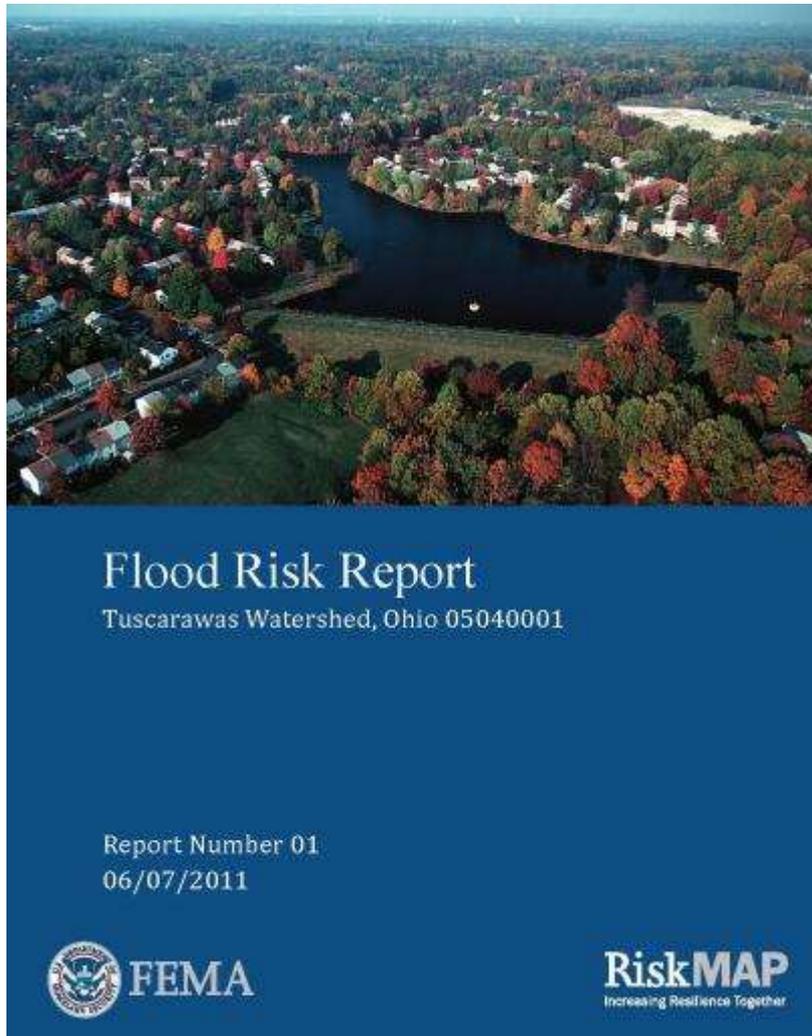
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Flood Risk Report

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Flood Risk Report Content Overview



- **Background:**
 - Purpose, Methods
 - Risk Reduction Practices
- **Project Results**
 - Changes Since Last FIRM
 - Depth & Analysis Grids
 - Flood Risk Assessment
 - Areas of Mitigation Interest
 - Enhanced Analyses
- **Summarized by Locations**
 - Communities and Watersheds

Flood Risk Report Content – Risk Awareness and Risk Reduction Information

FLOOD RISK REPORT

1 Introduction

1.1 About Flood Risk

Floods are naturally occurring phenomena that can and do happen almost anywhere. In its most basic form, a flood is an accumulation of water over normally dry areas. Floods become hazardous to people and property when they inundate an area where development has occurred, causing losses. Mild flood losses may have little impact on people or property, such as damage to landscaping or the generation of unwanted debris. Severe flooding can destroy buildings, ruin crops, and cause critical injuries or death.

1.1.1 Calculating Flood Risk

It is not enough to simply identify where flooding may occur. Just because one knows where a flood occurs does not mean they know the risk of flooding. The most common method for determining flood risk, also referred to as vulnerability, is to identify the probability of flooding and the consequences of flooding. In other words:

Flood Risk (or Vulnerability) = Probability x Consequences,
where

Probability = the likelihood of occurrence

Consequences = the estimated impacts associated with the occurrence

The probability of a flood is the likelihood that a flood will occur. The probability of flooding can change based on physical, environmental, and/or contributing engineering factors. Factors affecting the probability that a flood will impact an area range from changing weather patterns to the existence of mitigation projects. The ability to assess the probability of a flood and the level of accuracy for that assessment are also influenced by modeling methodology advancements, better knowledge, and longer periods of record for the water body in question.

The consequences of a flood are the estimated impacts associated with the flood occurrence. Consequences relate to humans activities within an area and how a flood impacts the natural and built environments.

1.1.2 Risk MAP Flood Risk Products

Through Risk MAP, FEMA provides communities with updated Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) that



Flooding is a natural part of our world and our communities. Flooding becomes a significant hazard, however, when it intersects with the built environment.

Which picture below shows more flood risk?



Even if you assume that the flood in both pictures was the same probability—let's say a 10-percent-annual-chance flood—the consequences in terms of property damage and potential injury as a result of the flood in the bottom picture are much more severe. Therefore, the flood risk in the area shown in the bottom picture is higher.

4.3 Mitigation Programs and Assistance

Not all mitigation activities require funding (e.g., local policy actions such as strengthening a flood damage prevention ordinance), and those that do are not limited to outside funding sources (e.g., inclusion in local capital improvements plan, etc.). For those mitigation actions that require assistance through funding or technical expertise, several state and federal agencies have flood hazard mitigation grant programs and offer technical assistance. These programs may be funded at different levels over time or may be activated under special circumstances such as after a presidential disaster declaration.

4.3.1 FEMA Mitigation Programs and Assistance

FEMA awards many mitigation grants each year to states and communities to undertake mitigation projects to prevent future loss of life and property resulting from hazard impacts, including flooding. The FEMA Hazard Mitigation Assistance (HMA) programs provide grants for mitigation through the programs listed in Table 4.2 below.

Table 4-2. FEMA Hazard Mitigation Assistance Programs

Mitigation Grant Program	Authorization	Purpose
Hazard Mitigation Grant Program (HMGP)	Robert T. Stafford Disaster Relief and Emergency Assistance Act	Activated after a presidential disaster declaration; provides funds on a sliding scale formula based on a percentage of the total federal assistance for a disaster for long-term mitigation measures to reduce vulnerability to natural hazards
Flood Mitigation Assistance (FMA)	National Flood Insurance Reform Act	Reduce or eliminate claims against the NFIP
Pre-Disaster Mitigation (PDM)	Disaster Mitigation Act	National competitive program focused on mitigation project and planning activities that address multiple natural hazards





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Flood Risk Map

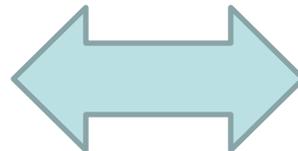


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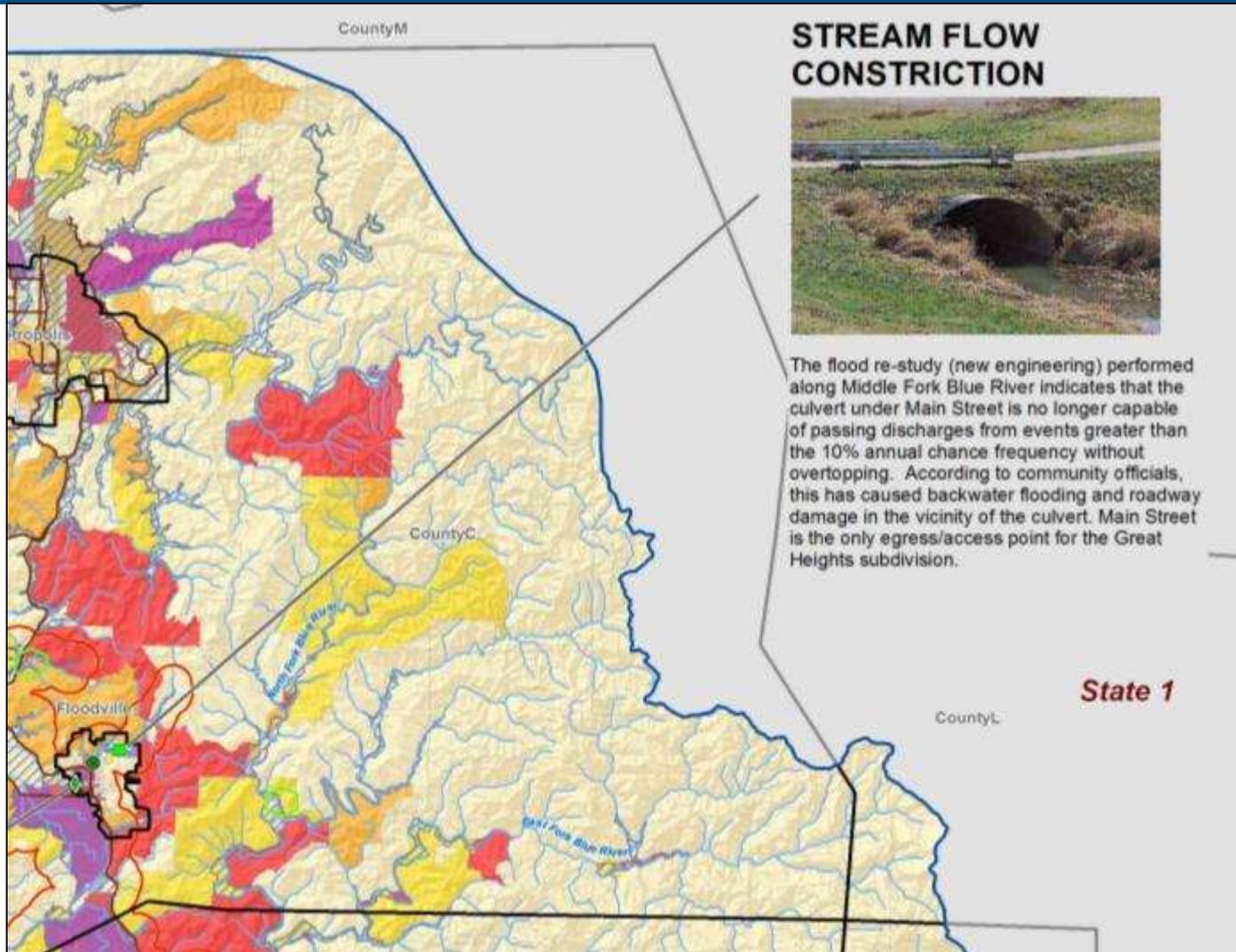


Background

- The FRM's intent is to provide a geographic summary of risks within the project area
- The FRM is not a regulatory product, and is intended to focus on specifically-identified risk areas
- In most cases, the FRM is created along with the FRD as companion elements to the H & H study
- This integrated approach is to produce a map that requires little or no manual cartographic finishing



Flood Risk Map





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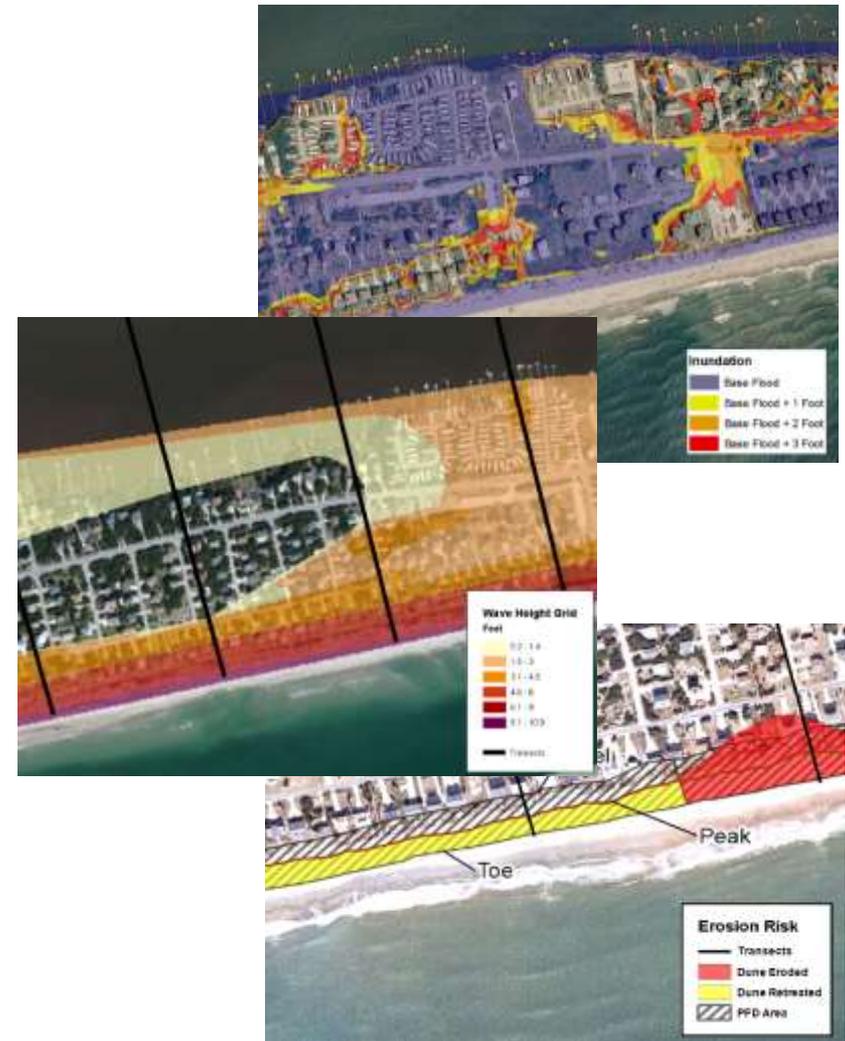
Non-Regulatory Product Enhancements for Coastal, Dams, & Levees

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Non-Regulatory Datasets – Coastal

- Leverages results from coastal analysis
- Enhanced datasets include:
 - Flood Depth grid
 - Flood Depth grids based on hypothetical 1-ft increments in sea level rise
 - Wave Height grid
 - Primary Frontal Dune datasets
 - Storm-Induced Erosion Risk (High: removed; Medium: retreat)
 - Vulnerability grid (Dune Height relative to Stillwater Elevation)
- Data would be used to communicate risks & promote mitigation

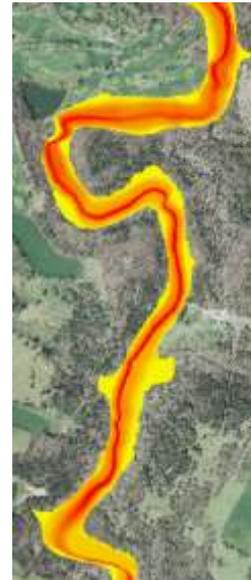
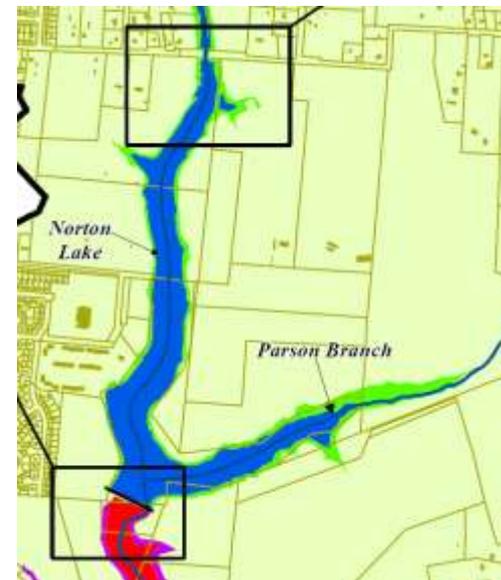


Non-Regulatory Datasets – Dams

- Leverages existing analysis from dam safety officials
- Flexible depending on varying state regulations & methods
- Enhanced datasets include:
 - Basic dam characteristics
 - Upstream inundation areas delineated
 - Downstream inundation areas delineated
 - Assorted depth and analysis grids (depth, velocity, arrival time)
 - Easements & critical facilities
 - Flood risk assessments
 - Additional Areas of Mitigation Interest categories
- Data would be used to communicate risks & promote mitigation



Emergency Spill-Crest Failure: Population at Risk = 450
Sunny Day Failure: Population at Risk = 266
100 Year Flood Event: Population at Risk = 167

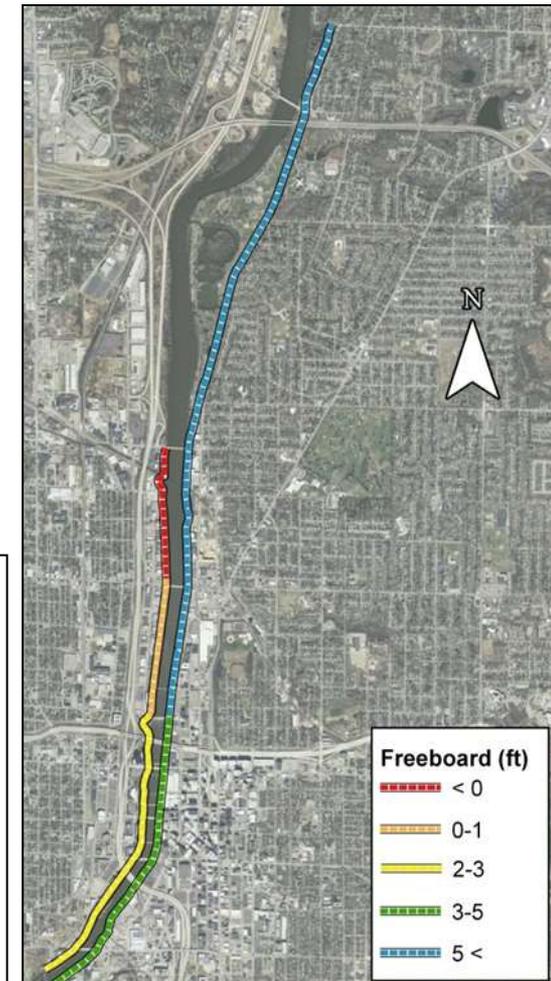
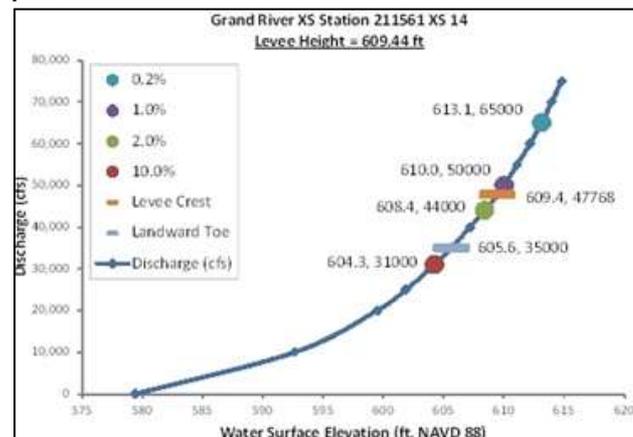


Non-Regulatory Datasets – Levees

- Leverages existing analysis from levee owners
- Displays information for levee scenarios based on combinations of flood event, levee accreditation status, and flood source

- Enhanced datasets include:

- Levee Location
- Levee point elements (pumps, conduits, closure structures)
- Rating Curves
- Freeboard
- Behind-levee flood extent (boundary and raster)
- Critical facilities
- Flood risk assessments



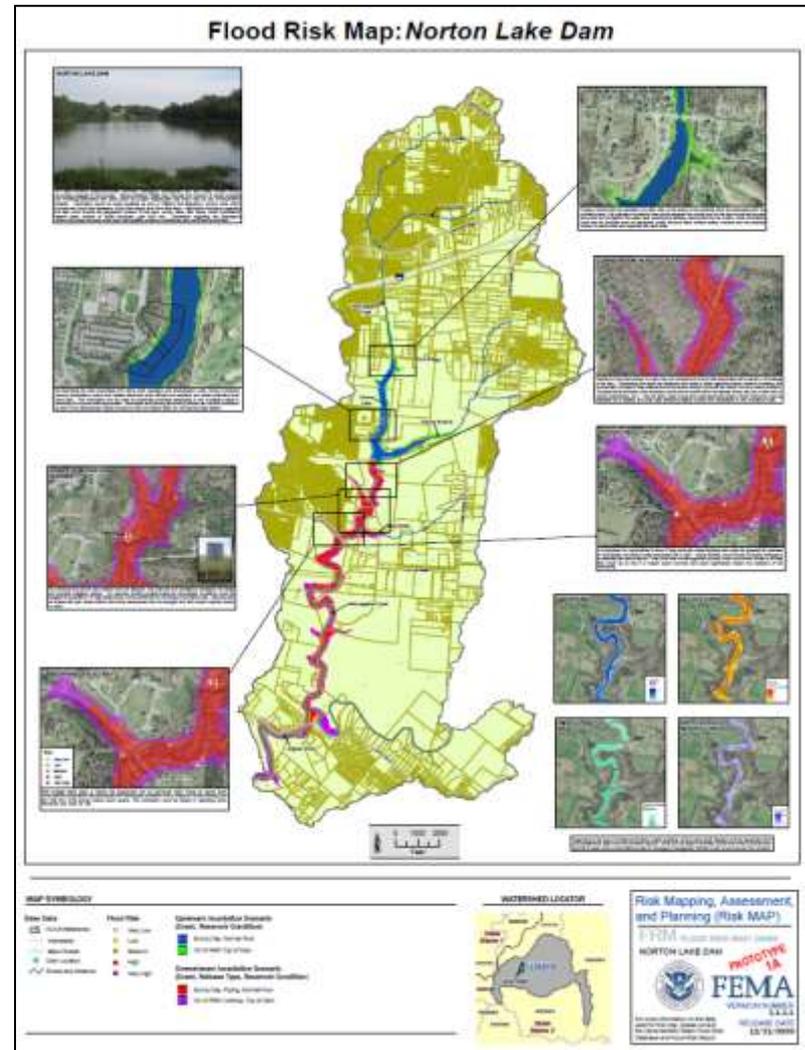
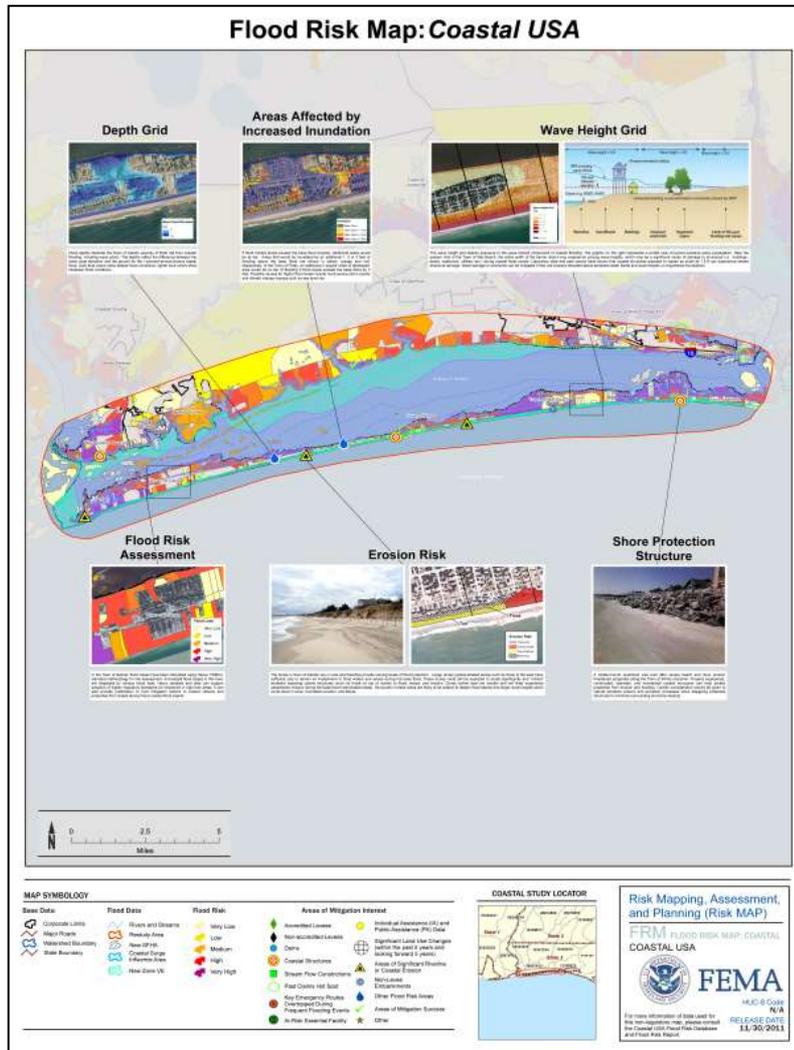
Flood Risk Report Enhancements

- Additional sections and tables to be added
- Special mitigation considerations
- Information will be referenced by community
- Should drive the conversation towards flood risk awareness & mitigation

Flood Event Frequency	Area of Additional Inundation (mi ²)				
	1-ft Increase	2-ft Increase		3-ft Increase	
		Newly Inundated	Total	Newly Inundated	Total
10%-annual-chance	##	##	##	##	##
2%-annual-chance	##	##	##	##	##
1%-annual-chance	##	##	##	##	##

Dam	Upstream / Downstream	Scenario	Total Area (mi ²)	Total Area (Acres)
Dam A	Upstream	Top of Dam + PMF	##	#
		Normal Pool + 1%	##	#
	Downstream	Normal Pool + PMF + Piping Failure	##	#
		Top of Dam + 1% + Overtopping Failure	##	#
Dam B	Upstream	Top of Dam + PMF	##	#
		Normal Pool + 1%	##	#
	Downstream	Normal Pool + PMF + Piping Failure	##	#
		Top of Dam + 1% + Overtopping Failure	##	#

Flood Risk Map Enhancements



Guidance for Non-Reg Datasets & Products

▪ Published Guidance

- OG: for Version 1.0 of Flood Risk Data and Products in FY 2010 – (9/2010)
- PM #65 – Flood Risk Database Standards (4/2011)
- OG: Communicating Flood Risk with Risk MAP Datasets and Products (7/2011)
- OG: Creation of Risk MAP Products (10/2011)
- OG: User Guidance for Flood Risk Datasets and Products (12/2011)

▪ Draft Guidance

- OG: Selection of Enhanced Flood Risk Products
- Appendix N – provides more information on how to produce products, defines content & best practices
- Appendix O – will replace Flood Risk Database PM, but also describes the standards for the Report & Map

▪ Future Guidance

- New specific guidance and best practices documents have recently been drafted for the Flood Risk Products and Datasets—will be released this Spring as a part of FEMA's Guidance and Standards Transformation Process

Questions



Andrew.Read@fema.dhs.gov