



GREENHORNE & O'MARA

CONSULTING ENGINEERS

North Eastern Pennsylvania Post-Flood Risk Evaluation

Presented by:
Deepa Srinivasan
Hilary Stephens

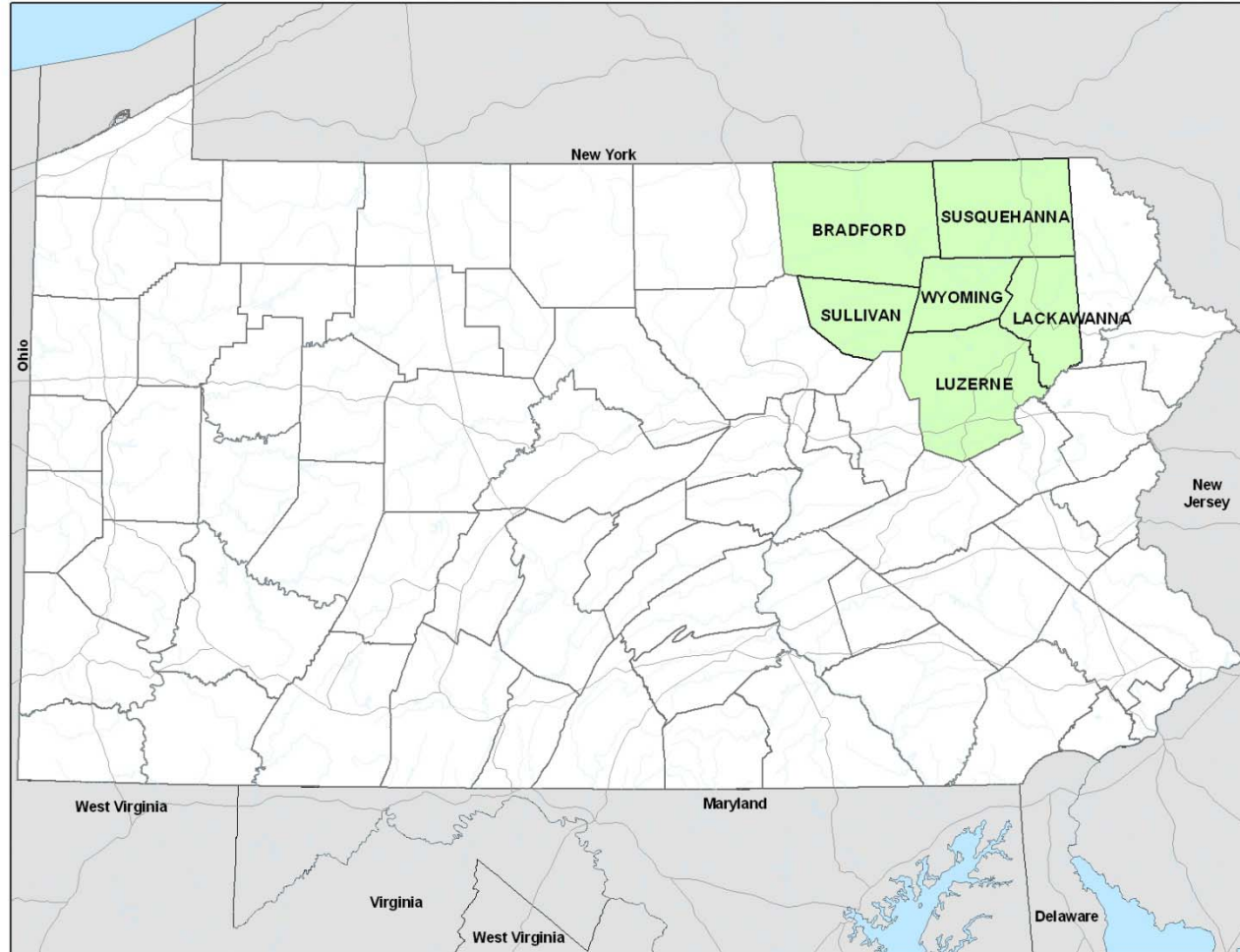
GG3 Project Team
Greenhorne and O'Mara
Gannett Fleming



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North Eastern Pennsylvania Post-Flood Risk Evaluation





Purpose of Project

- Coordinate and identify flood study areas of concern
- Discuss/identify changes in relation to the mapped floodplain and recent flood observations
 - Data Sources
 - Post Flood Evaluation Questionnaires
 - County Post Flood Coordination Meetings





Coordination with Agencies

- US Corps of Engineers
- Susquehanna River Basin Commission
- PA Department of Community and Economic Development
- PA Department of Environmental Protection
- Pennsylvania DOT District 6
- PA MAP (through the PA Geological Survey)
- Counties and their municipalities





Project Phases

- Phase 1 – Compilation of Data and Coordination with State and Local Government
 - Phase 2 – Evaluation of Hydrology and Hydraulic Models
 - Phase 3 – Identification and Prioritization of Map Update Needs
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Post Flood Evaluation Questionnaire

Purpose

- Gather 1st hand information from communities on experiences during flooding events
 - Performance of the FIS and FIRM during flooding events
 - Prioritize areas for future FIRM updates within the 5 county region and within each county.
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Post Flood Evaluation Questionnaire

185 municipalities in 5 county area

- Responses by 86 communities (46%)
- Outreach
 - Mailers
 - Phone calls
 - Emails

County Liaisons

- Planning Director
 - Emergency Management Director
 - Conservation District staff person
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Questionnaire Highlights

Problems faced by communities as a result of the 2006 flooding

- Housing loss
- Basement flooding
- Infrastructure damage
- Levee breach
- Sewer line damage
- Agricultural damage
- Well contamination
- Damage to businesses





Questionnaire Highlights

1. Flood history

- Major flooding events
- Primary flooding sources
- Properties in the floodplain
- Repetitive loss structures
- Monetary damage
- New development and growth





Questionnaire Highlights

2. Mapping

- FIRM date and accuracy
- Availability of FIRMs to analyze potential flooding impact prior to June 2006 flood
- Flooded streams not on FIRM
- Overtopped structures and bridges not shown on FIRM
- Inconsistencies between Adjacent communities' FIRMs
- New road crossings built over a flooding source
- Bridge replacements
- GIS data available





Questionnaire Highlights

3. Mitigation Measures

- Levees/dikes breaching
- Flood control projects
- Stream gauges
- Flood mitigation steps





Questionnaire Highlights

4. Community Preparedness

- Adequacy of community's preparedness
- Use of shelters
- Accuracy of flood forecasting systems
- Adequacy of flood warning systems
- Adequacy of public outreach





County Post Flood Coordination Meetings

- Participation
- Education
- Data Collection
- Data Validation





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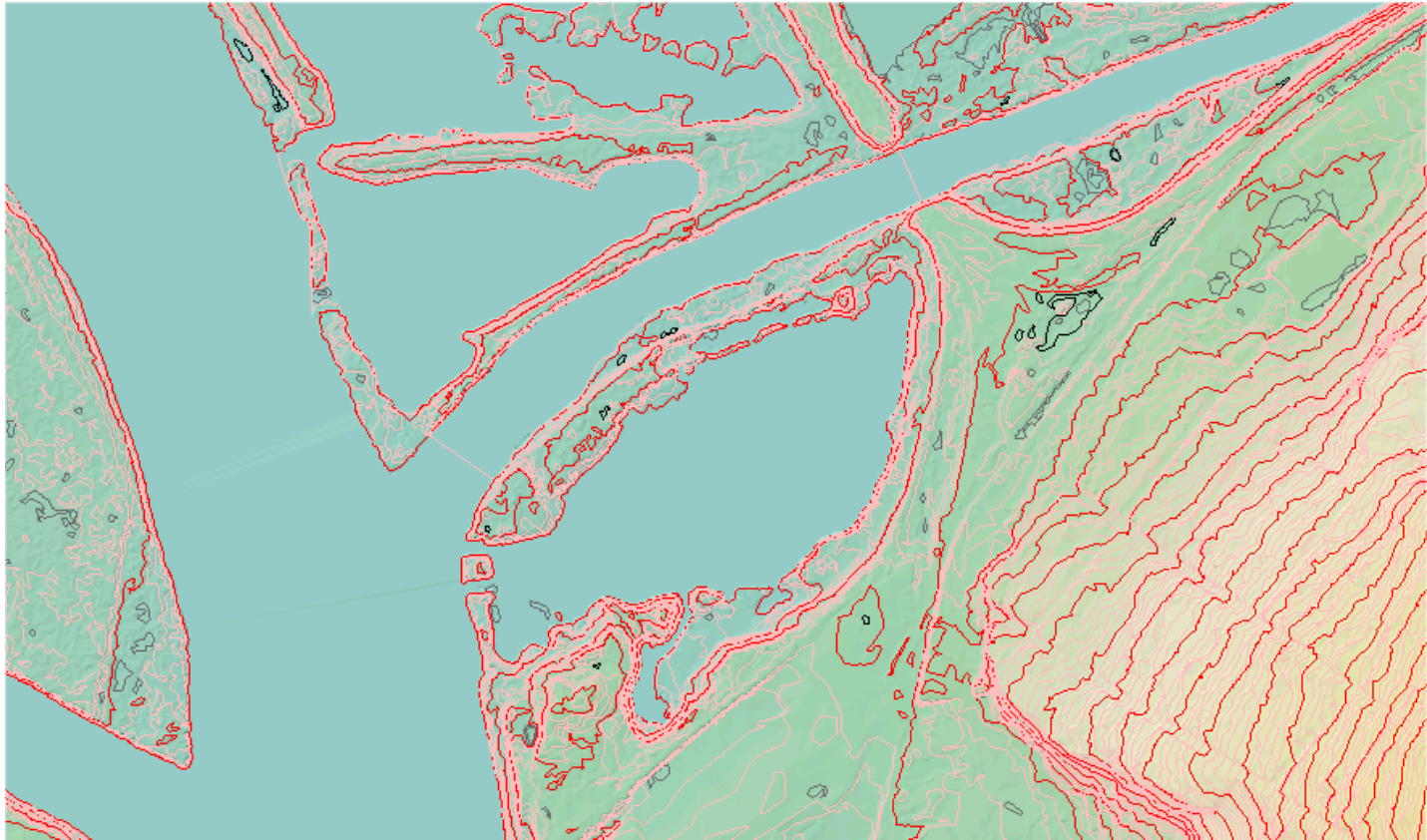


PAMAP Data - Orthophotography





PAMAP Data – LiDAR Terrain



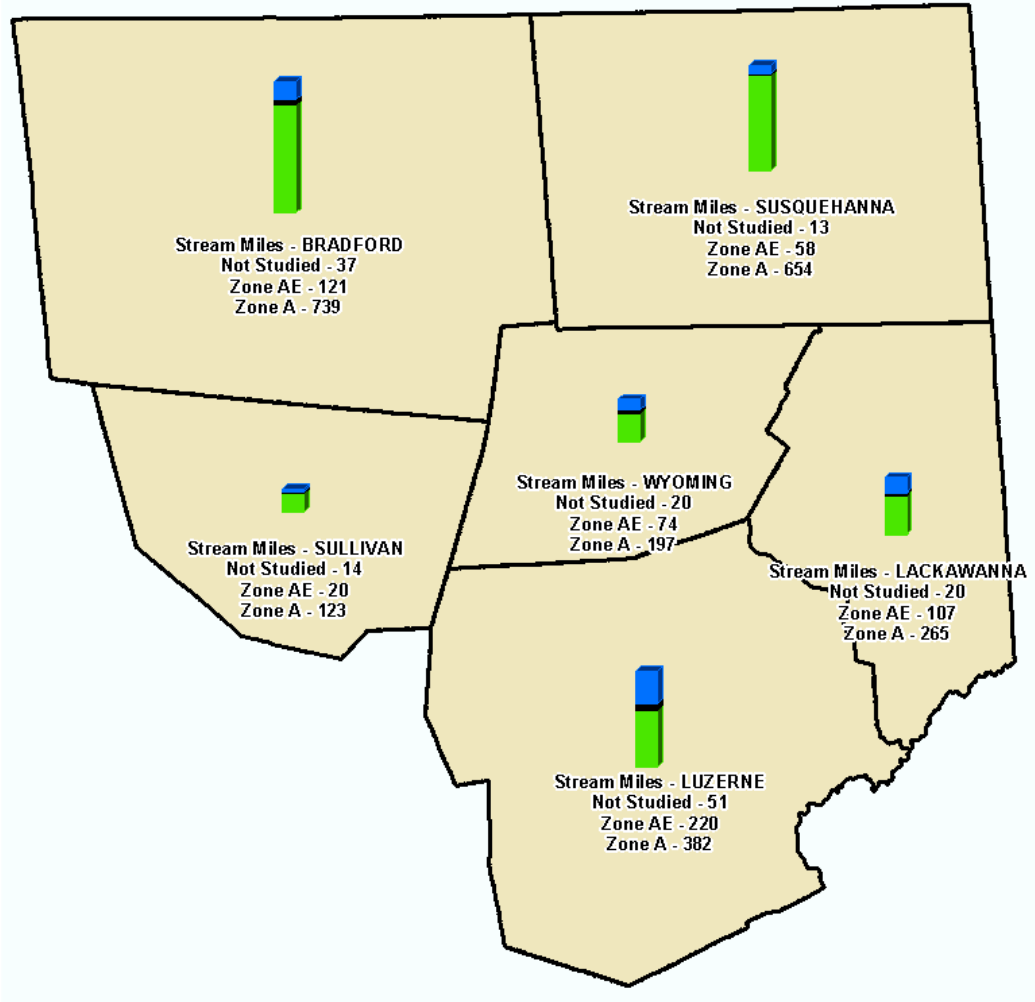


Q3 - FEMA



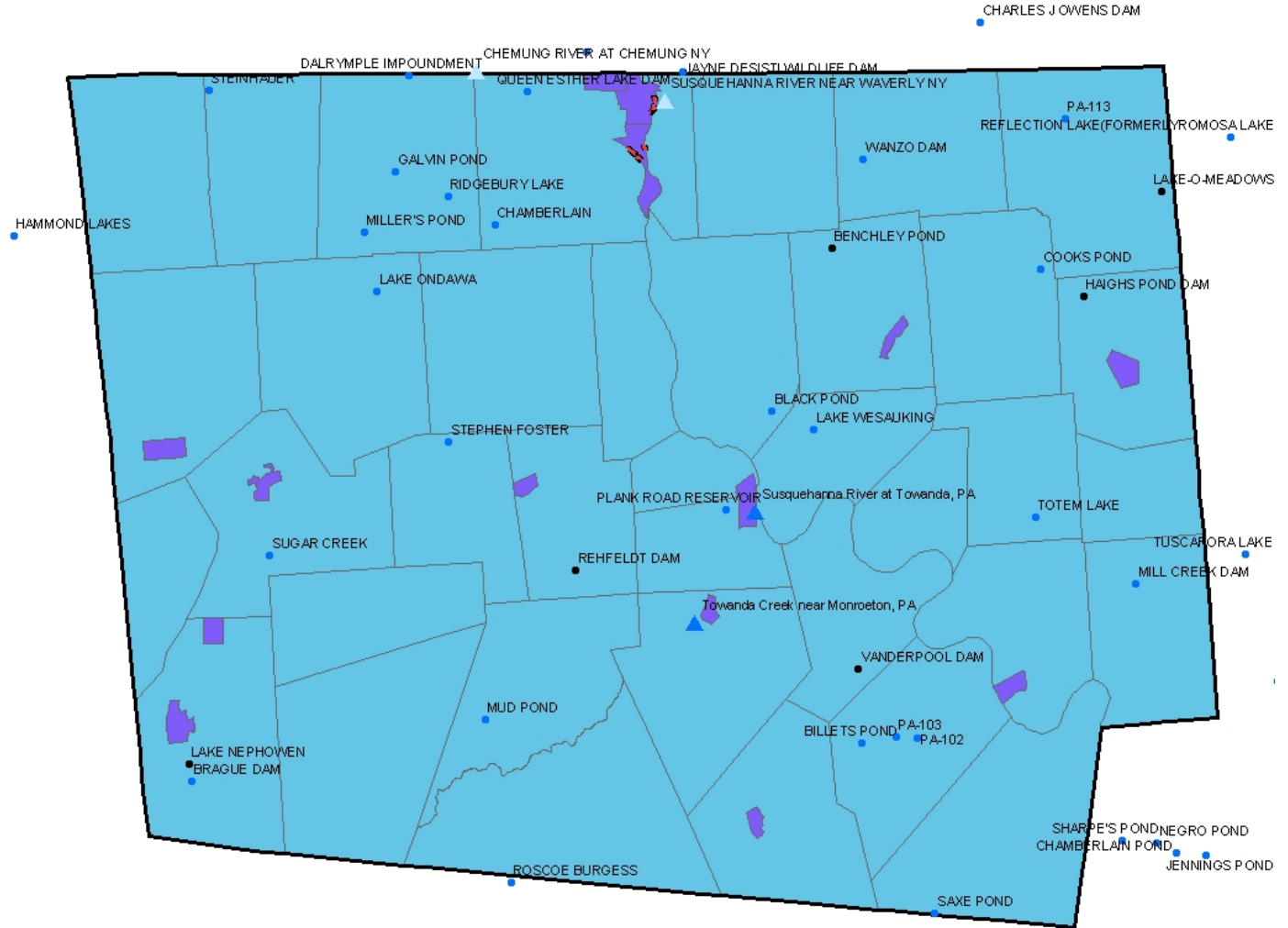


Stream Miles Detailed/Approximate Studies



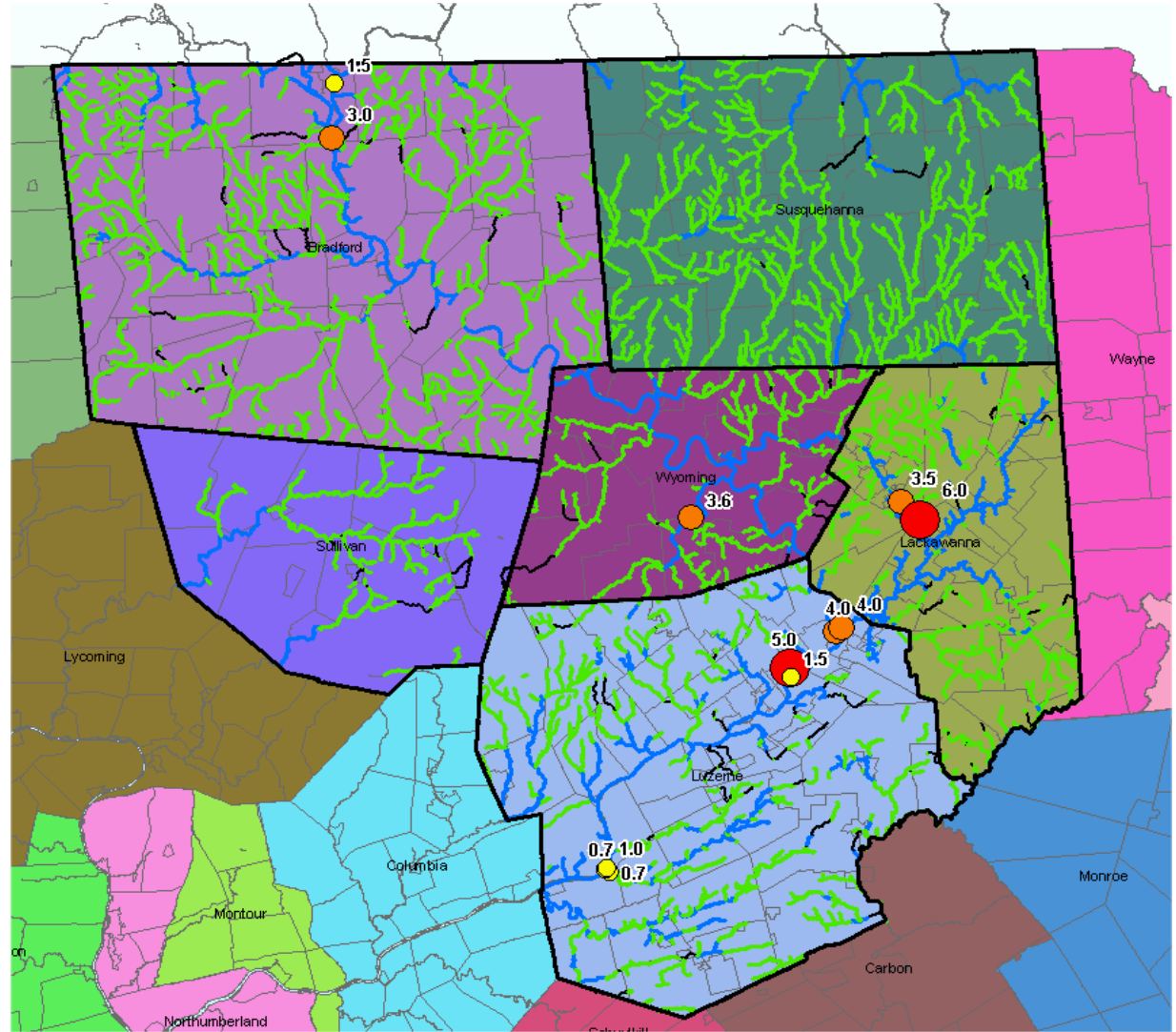


Areas of Detailed Flooding



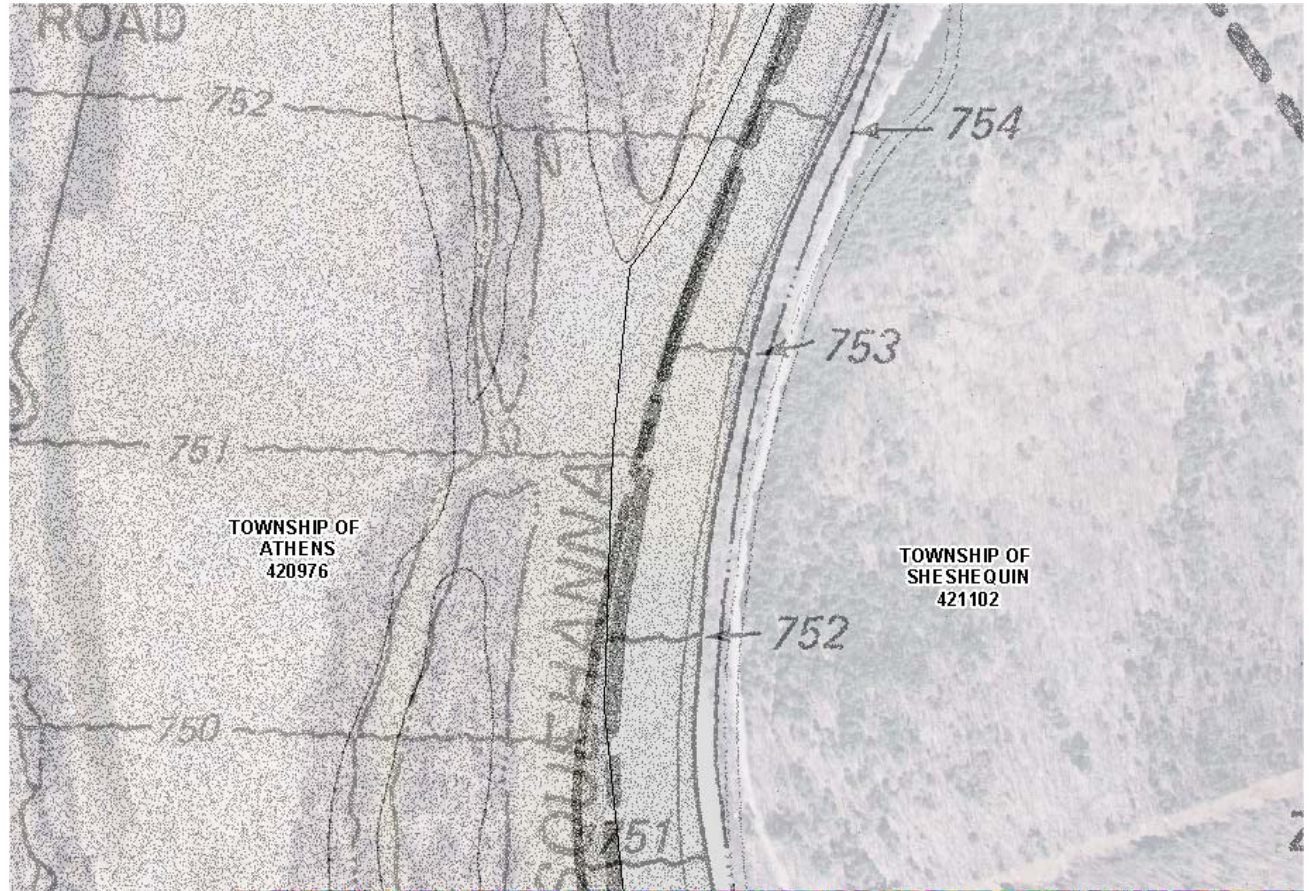


Community Mismatches



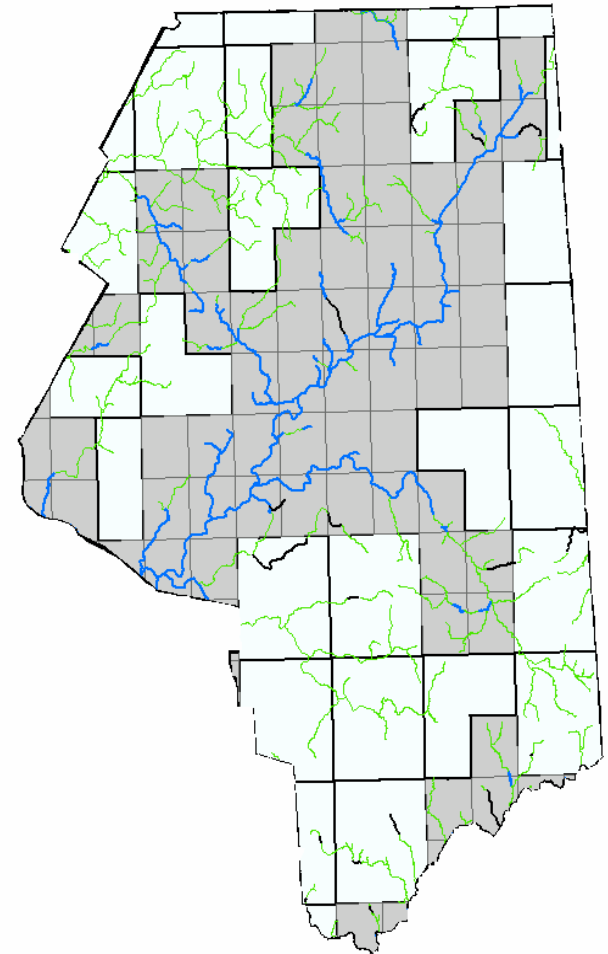
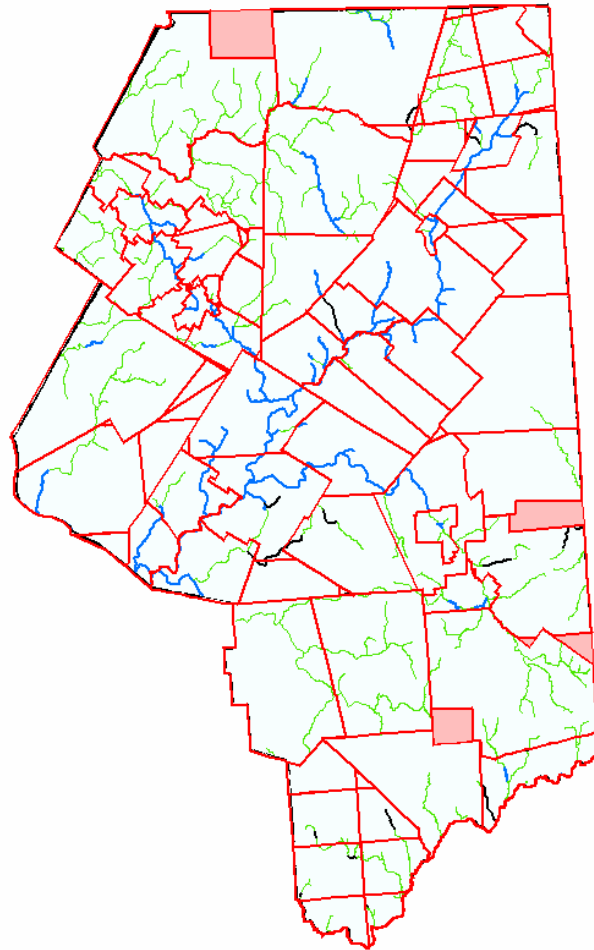


Community Mismatches





New Countywide DFIRM





Phase 2 - Evaluation of Hydrology and Hydraulic Models

- Evaluate current effective FEMA model(s), mapping and profiles for tie-in issues at/along community boundaries
 - Compare existing conditions to modeled bridges & culverts
 - Compare existing to modeled flood control structures
 - Investigate horizontal stream displacement
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Phase 3 – Identify and Prioritize Map Update Needs

Develop a prioritization table for each community based on:

- Information from post-flood coordination meeting
- Evaluation of the hydrology and hydraulic changes

Assign points and rank into 3 categories

- Emergency - Needed for Mitigation Response Activities
 - Priority - In support of Mitigation Recovery Activities
 - Routine - Normal Restudy Needs List
-



Community Prioritization Matrix

Criteria	10 points	6 points	3 points	0 points
Age of Flooding Data on Maps	>10 years	7-10 years	5-7 years	<5years
Adjacent communities' FIRMs inconsistent with FIRM	Yes			No
Value of Flood Insurance Coverage (\$)	> \$10 million	\$1 million - \$10 million	\$100 k - \$1 million	< \$100 k
Number of Flood Insurance Policies	>100	21-100	20-May	<5
Number of Flood Insurance Claims	>40	Nov-40	10-May	<5
Ratio of Flood Insurance Policies to percent Detailed Study streams	>3	3-Feb	2-Jan	<1
Number of Repetitive Loss Properties	>10	10-May	4-Jan	0
Number of existing structures in community's floodplain	>50	25-50	25-Oct	<10
Number of areas of dense existing or anticipated development (subdivisions) built along flooding sources (since 1980)	>2	2	1	0
Number of new road crossings constructed over flooding sources (since 1980)	>4	2 to 4	1	0



Stream Reach Prioritization Matrix

Stream Reach Prioritization Matrix				
Criteria	10 points	6 points	3 points	0 points
Community Non-response Dependent Priority Category	High	Medium	Low	Zero
Community Response Dependent Priority Category	High	Medium	Low	Zero
Does the approximate HAZUS floodplain match the effective FIRMS? Reach varies from study by a maximum of ___ ft.	> 300'	60' - 300'	30' - 60'	0' - 30'
Discharge Rate Verification	Discharge >40% above rates in FIS	Discharge 20-40% above rates in FIS	Discharge >40% below rates in FIS	Discharge 20% above to 40% below rates in FIS
Number of areas of dense existing or anticipated development (subdivisions) built along flooding source (since 1980)	>2	2	1	0
Number of new road crossings constructed over flooding source (since 1980)	>1	1		0



Guidance for Validating Flood Hazard Data

Parameter		Points	
CATEGORY 1. Status Based on Flood Risk Information*			
Current Accuracy of the Effective Analysis			
Actual population change*	>1,000	100 to 1000	<100
Predicted (future) population change*	>1,000	100 to 1000	<100
Housing unit change*	>100	10 to 100	<10
Flood insurance policy change*;	>20	2 to 20	<2
Single flood insurance claims change*	>20	2 to 20	<2
Repetitive flood insurance losses change*	>20	2 to 20	<2
Number of declared flood insurance disasters change*	>5	1 to 4	0

– Categories Include:

- Status Based on Flood Risk Information
 - Current Accuracy of the Effective Analysis
- Physical Factors Impacting Analyses
 - Current Accuracy of the Hydrologic Analysis (Riverine)
 - Current Accuracy of the Hydraulic Analysis (Riverine)
 - Factors Affecting Stillwater Analyses (Coastal)
 - Factors Affecting Wave Height Analysis (Coastal)
 - State/Regional Authority/Community Issues



Post Flood Evaluation Report

- Recommendations from the federal/state partner meetings
 - Needs/recommendations from the county meetings
 - Survey and prioritization results
 - ArcGIS geodatabase
 - Plots highlighting hydrology & hydraulic changes
 - Plots of prioritized needs based on number range
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Our Successes!

- Gathered first hand information from communities on their experiences during the flood
- Provide feedback to State, counties, and communities on results and schedule
- New DFIRMs for counties to be completed in 2009/2010

