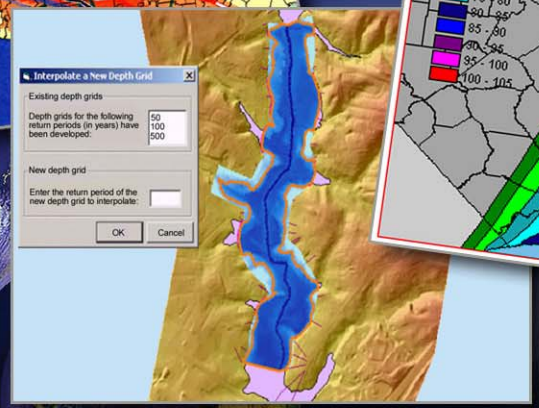
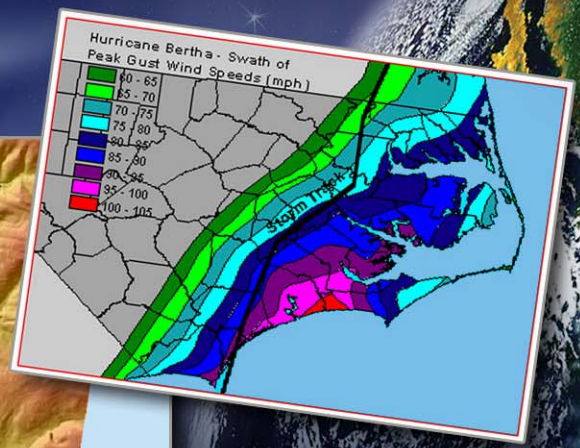
HAZUS® MH

EARTHQUAKE • WIND • FLOOD

FEMA's Software Program for Estimating Potential Losses from Disasters





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FEDERAL EMERGENCY MANAGEMENT AGENCY

EMERGENCY MANAGEMENT HIGHER EDUCATION CONFERENCE

HAZUS-MH Breakout Workshop Objectives

- Introduce HAZUS-MH and its applications
- Discuss opportunities for university support
  - Service learning opportunities
  - Resource for HAZUS-MH users
  - Student curriculum

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HAZUS-MH Breakout Workshop Agenda

- HAZUS-MH Overview
- Software Demonstration
- University Roles in Supporting Implementation
- Education Opportunities

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Earthquakes, Hurricanes, and Floods Will Continue to Occur…

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Earthquakes, Hurricanes, and Floods Will Continue to Occur…

How can we *plan* to minimize damage and loss of life to prevent natural hazards from becoming natural disasters?

By understanding potential losses and managing risks

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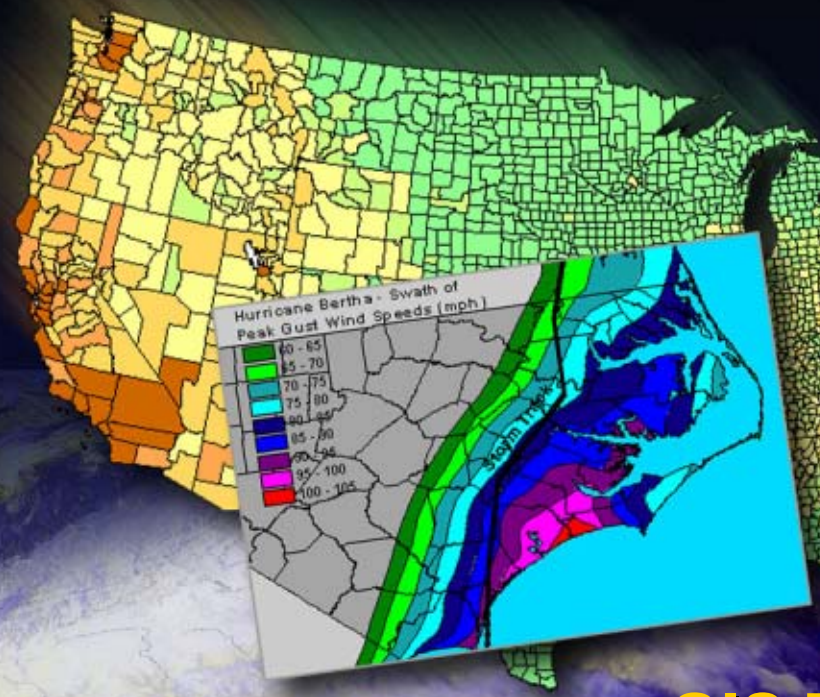
HAZUS-MH: Features



- Physical Impacts
- Economic Impacts
- Social Impacts

- GIS Technology
- Nationwide Databases
- Nationally Standardized Loss Estimation and Risk Assessment Methodology

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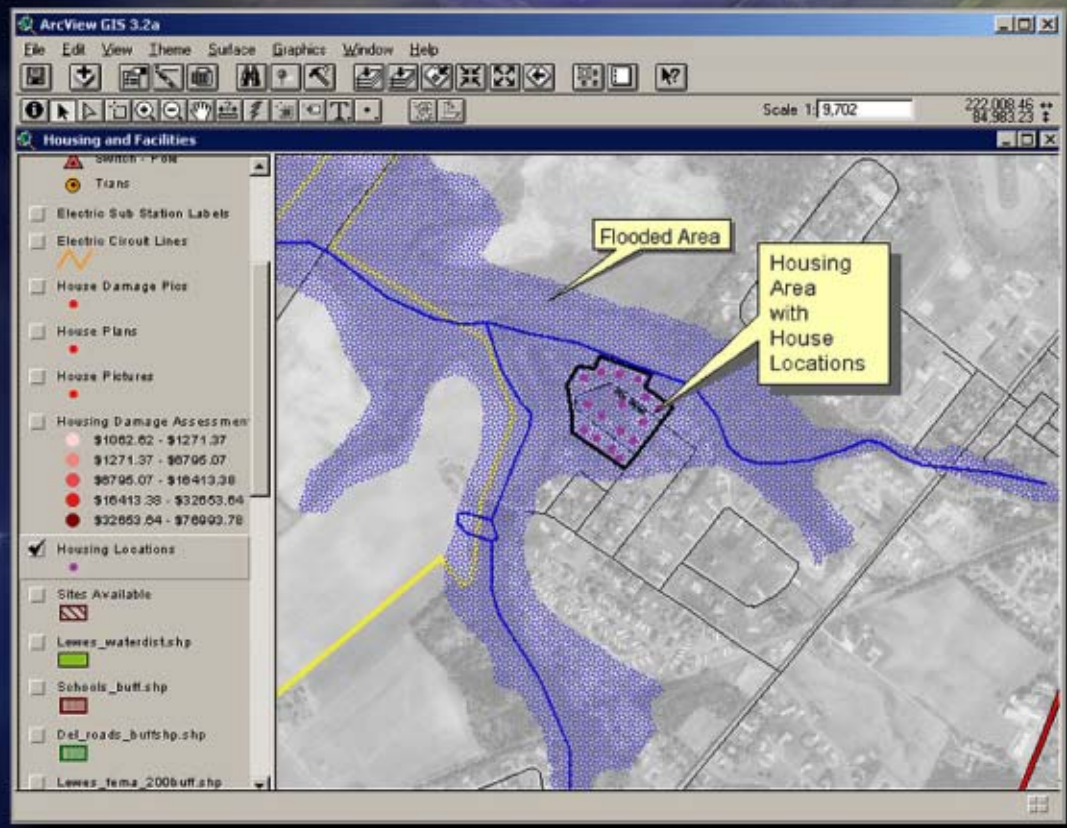
GIS Technology

- Spatial Relationships
  - Layers
  - Computations
- Risk Communication
  - Risks
  - Solutions



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Nationwide Databases

- **Demographics** – Population, Employment, Housing
- **Building Stock** – Residential, Commercial, Industrial
- **Essential Facilities** – Hospitals, Schools, Police Stations, Fire Stations
- **Transportation** – Highways, Bridges, Railways, Tunnels, Airports, Ports and Harbors, Ferry Facilities
- **Utilities** – Waste Water, Potable Water, Oil, Gas, Electric Power, Communication Facilities
- **High Potential Loss Facilities** –Dams and Levees, Nuclear Facilities, Hazardous Material Sites, Military Installations

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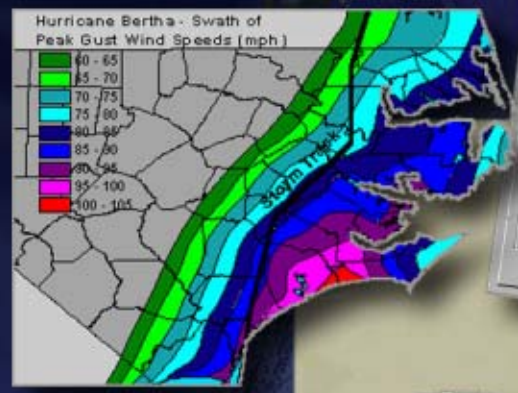
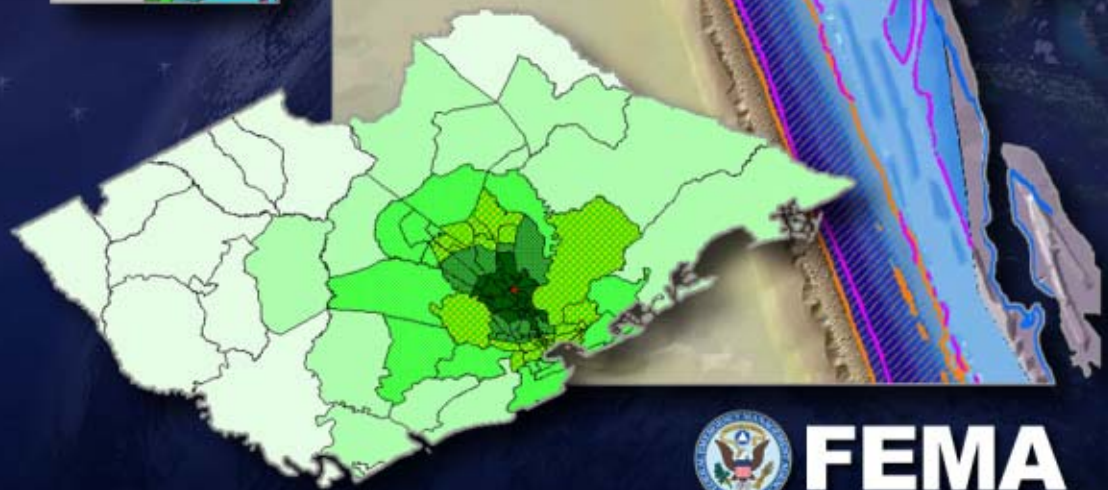
Nationally Standardized Loss Estimation and Risk Assessment Methodology

- Engineering Analysis
- Hazard-Specific Oversight Committees
  - Expert Practitioners
  - Academics
- Non-Proprietary
- Well Documented





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HAZUS-MH: Models

	Earthquake Ground Motion Ground Failure	Flood Frequency Depth Discharge Velocity	Hurricane Winds Pressure | Missile | Rain
Direct Damage			
General Building Stock	✓	✓	✓
Essential Facilities	✓	✓	✓
High Potential Loss Facilities	✓		✓
Transportation Facilities	✓	✓	
Lifelines	✓	✓	
Induced Damage			
Fire Following	✓		
Hazardous Materials Release	✓		✓
Debris Generation	✓	✓	✓
Direct Losses			
Cost of Repairs/Replacement	✓	✓	✓
Income Loss	✓	✓	
Crop Damage		✓	
Casualties	✓		
Shelter and Recovery Needs	✓	✓	✓
Indirect Losses			
Supply Shortages	✓	✓	
Sales Decline	✓	✓	
Opportunity Costs	✓	✓	
Economic Loss	✓	✓	

HAZUS-MH: Analysis Levels

Parameter Modification

InCAST – Inventory Collection and Survey Tool

BIT – Building Input Tool

FIT – Flood Inventory Tool

Level 1 and 2 analyses can usually be performed by emergency services or planning staff

Level 3 analysis typically requires specialized technical expertise

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HAZUS-MH is for a study area of any size

- Region
- Community
- Neighborhood
- Individual Site

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HAZUS-MH and Risk Management

Preparing for a Natural Hazard

What are our risks?

Where are the best locations for shelters and do we have enough space?

Where should we target outreach activities?

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Mitigating the Effects of a Natural Hazard

Where should we put our resources to achieve maximum benefit?

How much will this mitigation strategy decrease our losses?

Where are we in our mitigation plan? How have we progressed?

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Responding to a Natural Hazard

How many injuries do we expect?

What are the best evacuation routes?

What hospitals were damaged and where should we take our injured?

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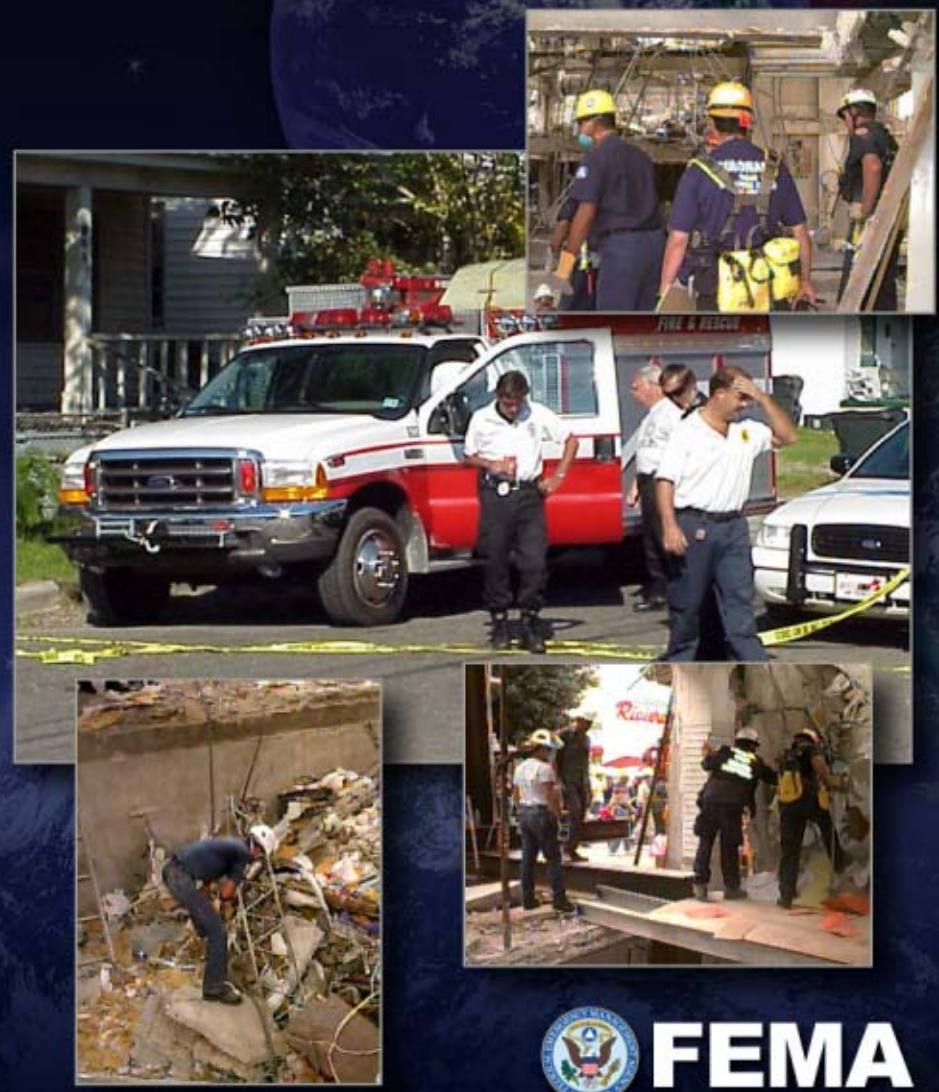
Recovering from a Natural Hazard

What is the demand on recovery staff?

How much debris do we have to remove?

How much funding does the community need to request to recover?



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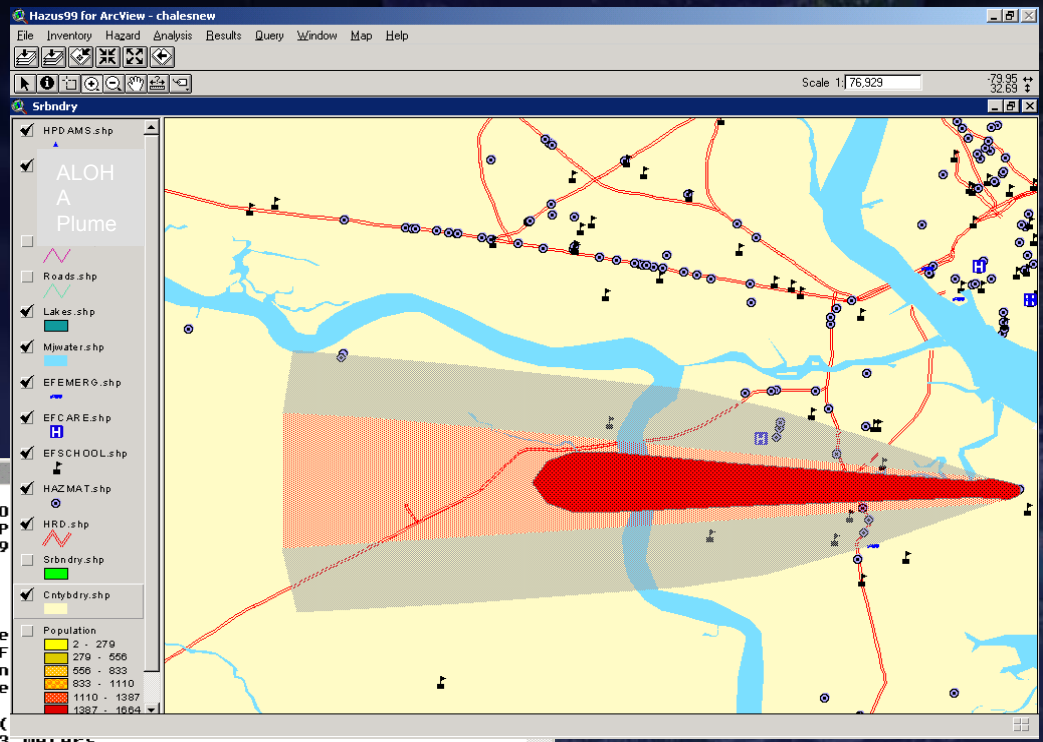
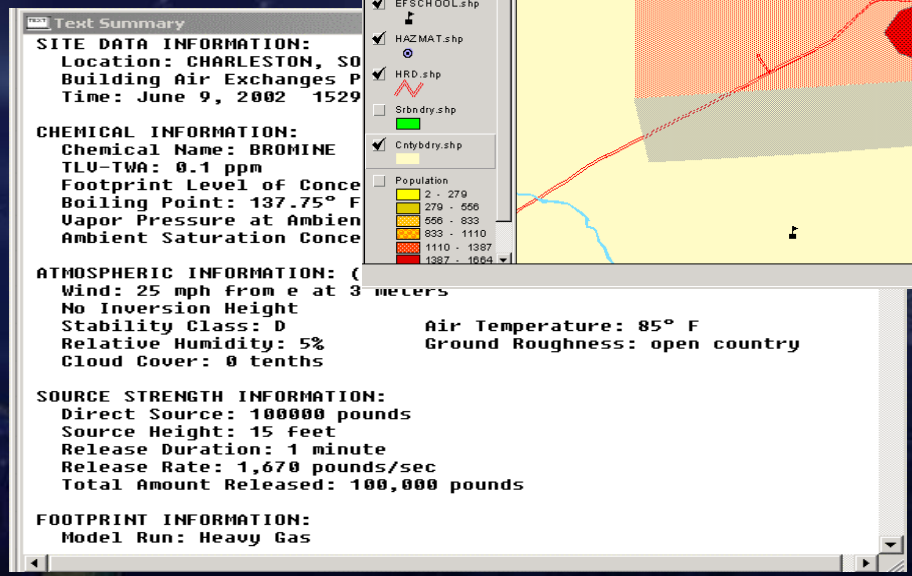
HAZUS MH Reaching Beyond Natural Disasters

- ALOHA Dispersion Modeling
- FLDWAV Dam Breach Modeling





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HAZUS-MH Breakout Workshop Agenda

- HAZUS-MH Overview
- **Software Demonstration**
- University Roles in Supporting Implementation
- Education Opportunities

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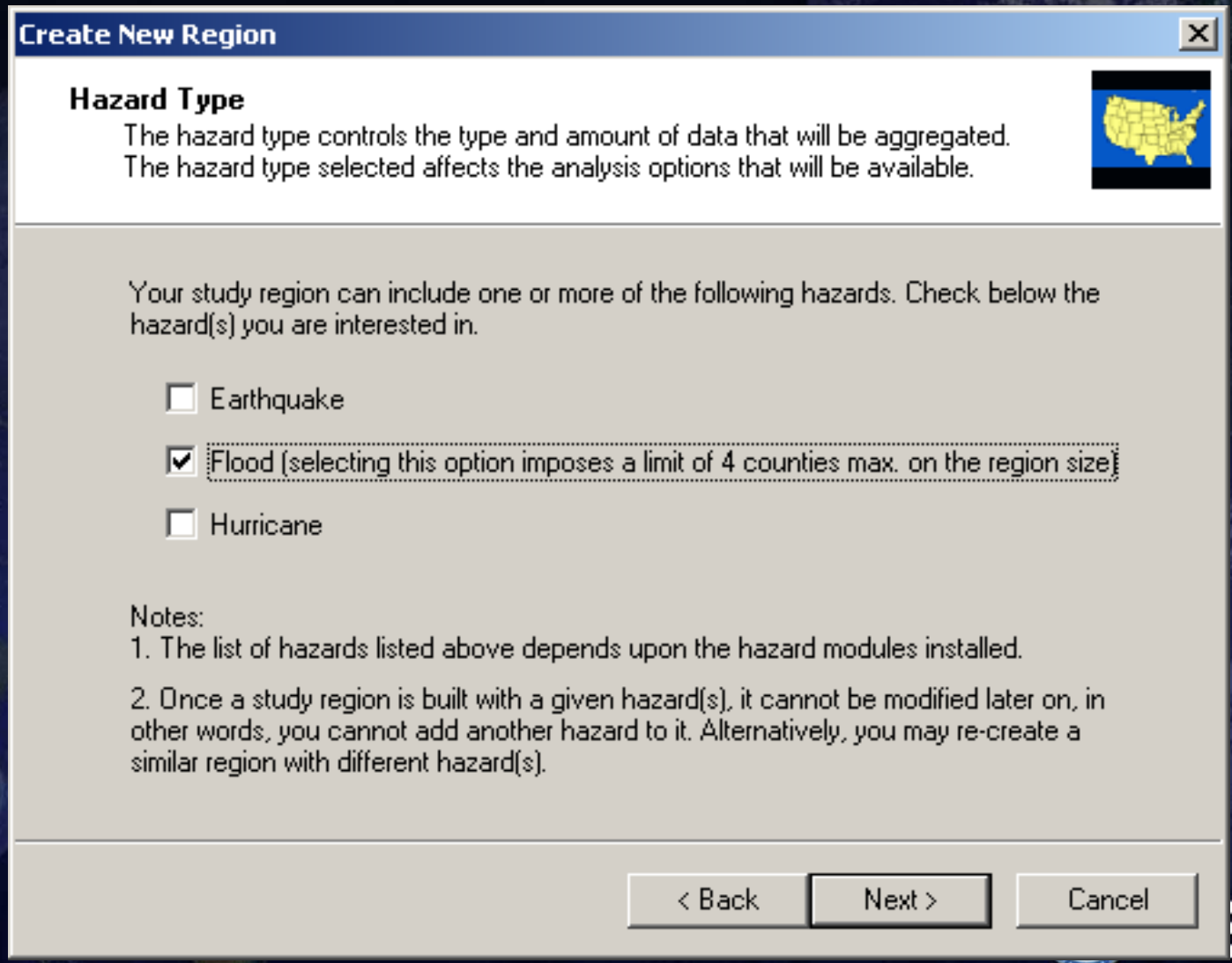
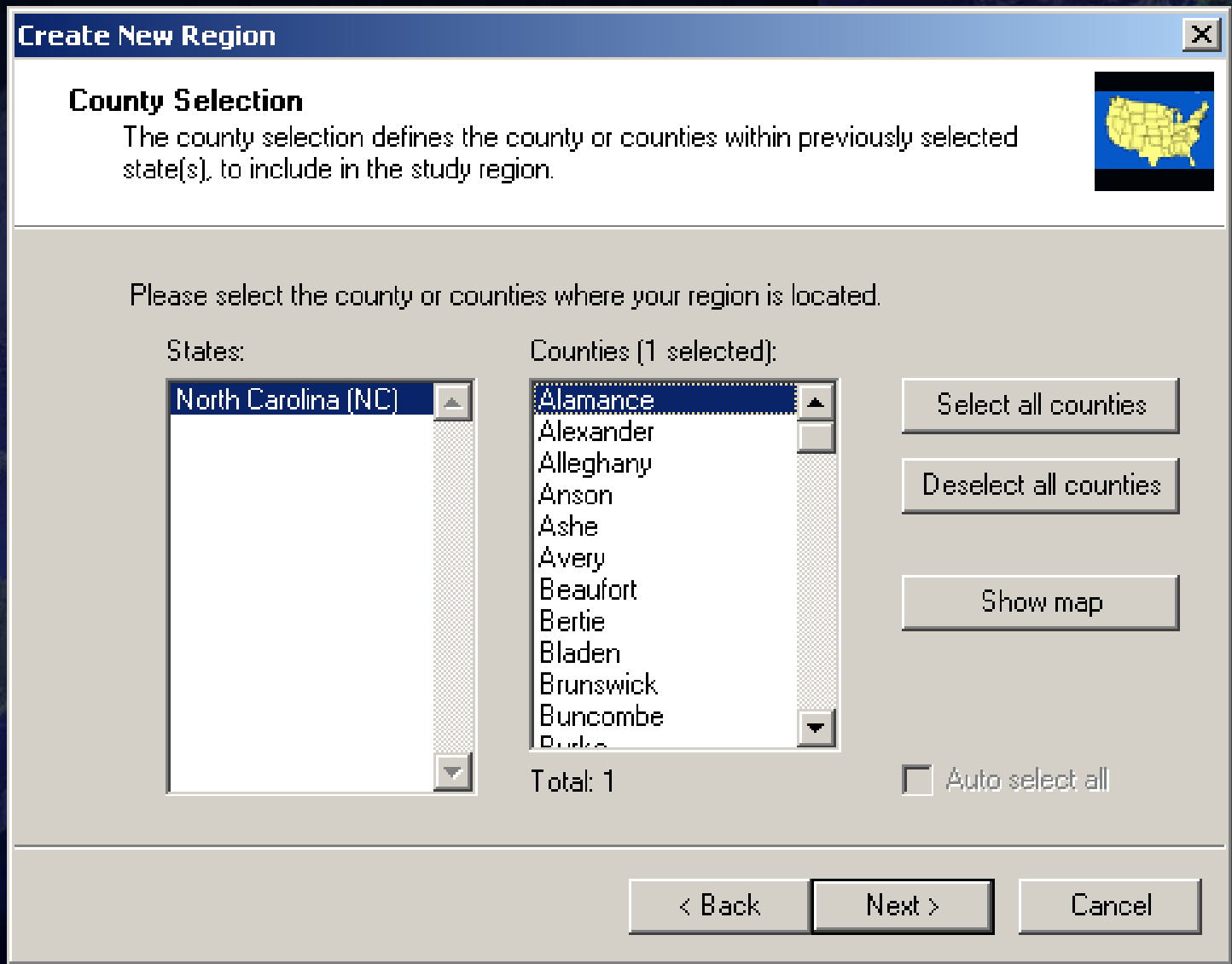
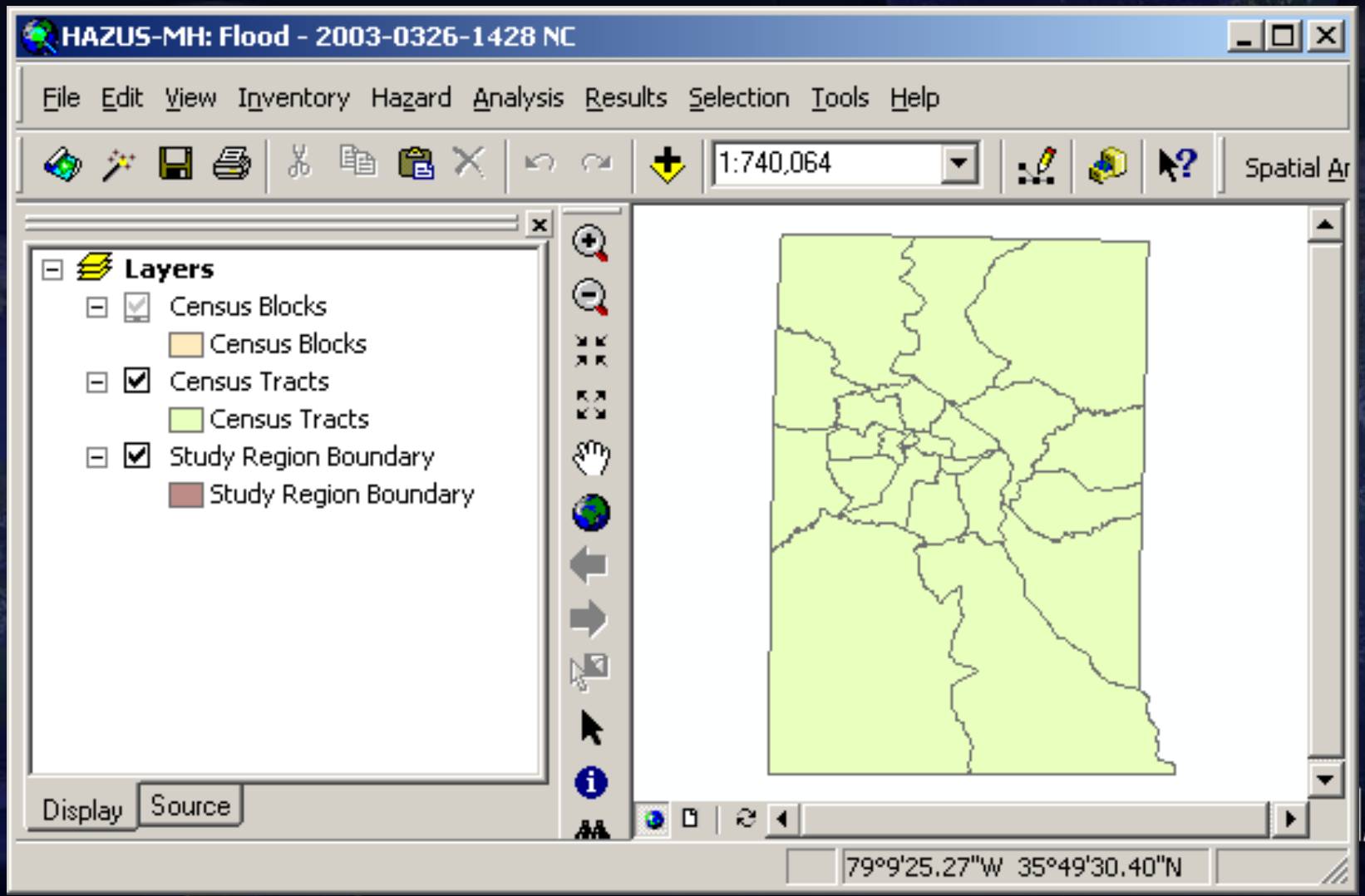
Selecting a Hazard Model in the Start-up Wizard



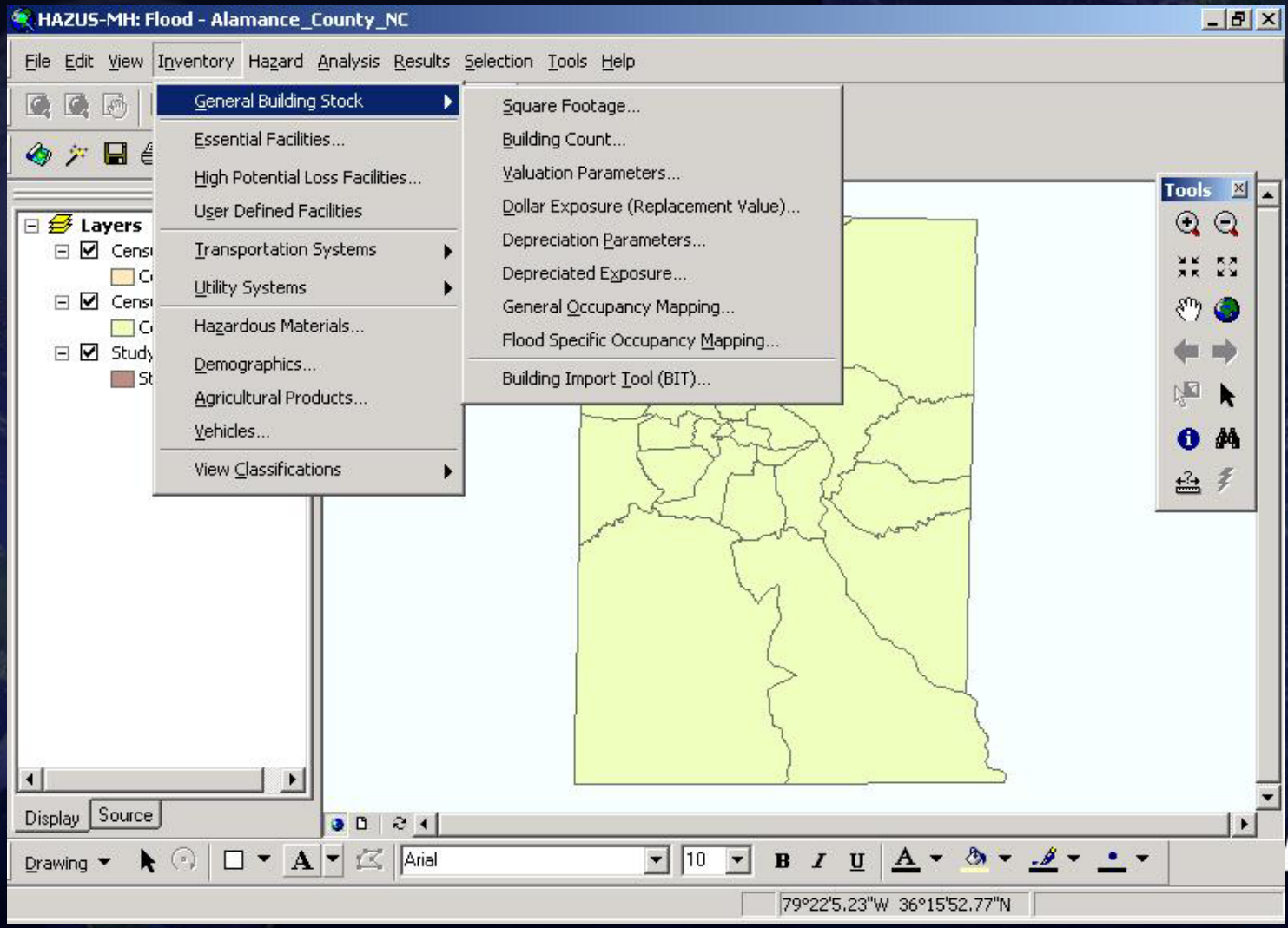
Selecting Study Region County in the Start-up Wizard



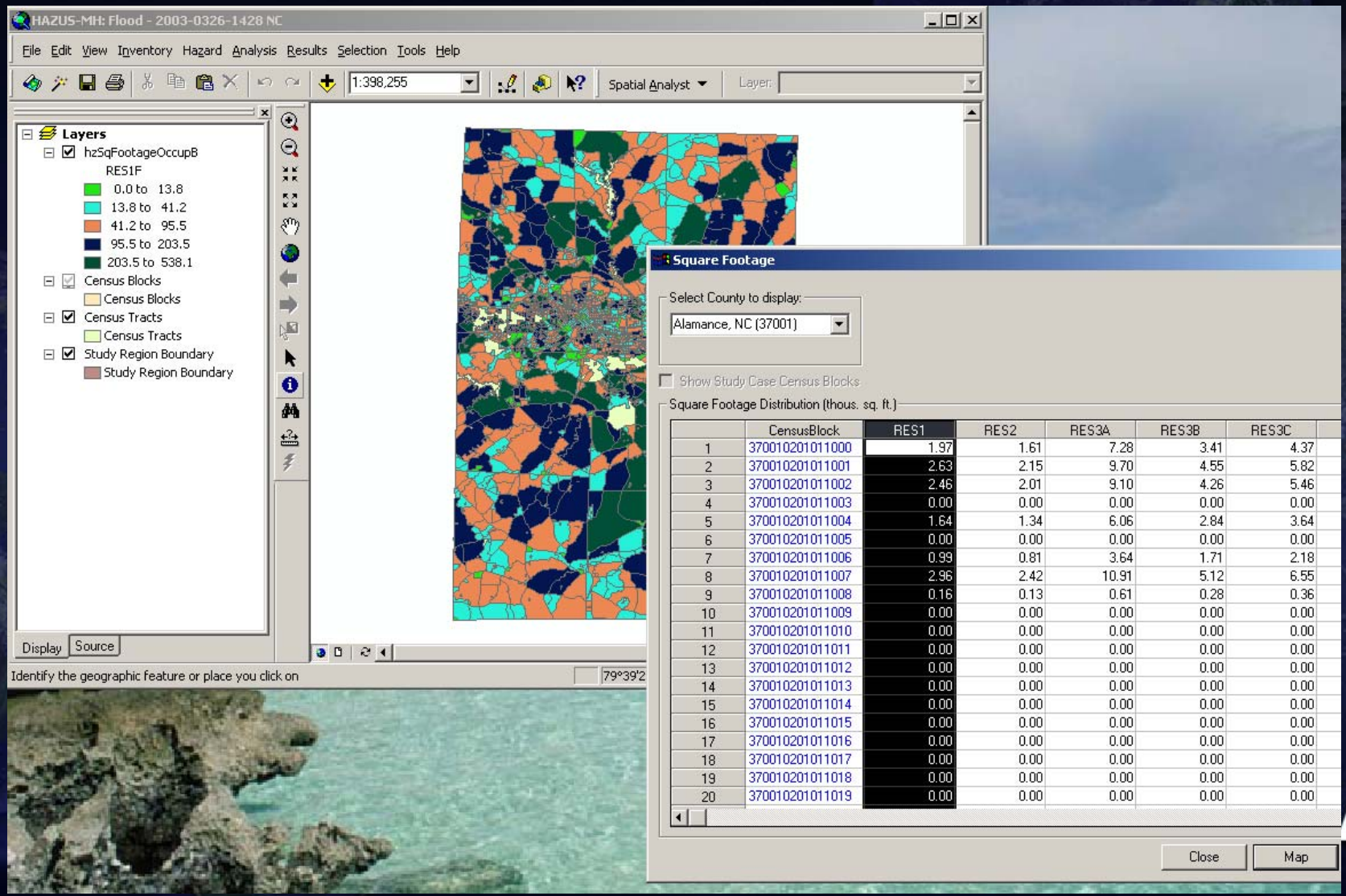
Alamance County as Seen in the Flood Model



Inventory and General Building Stock Menu Items

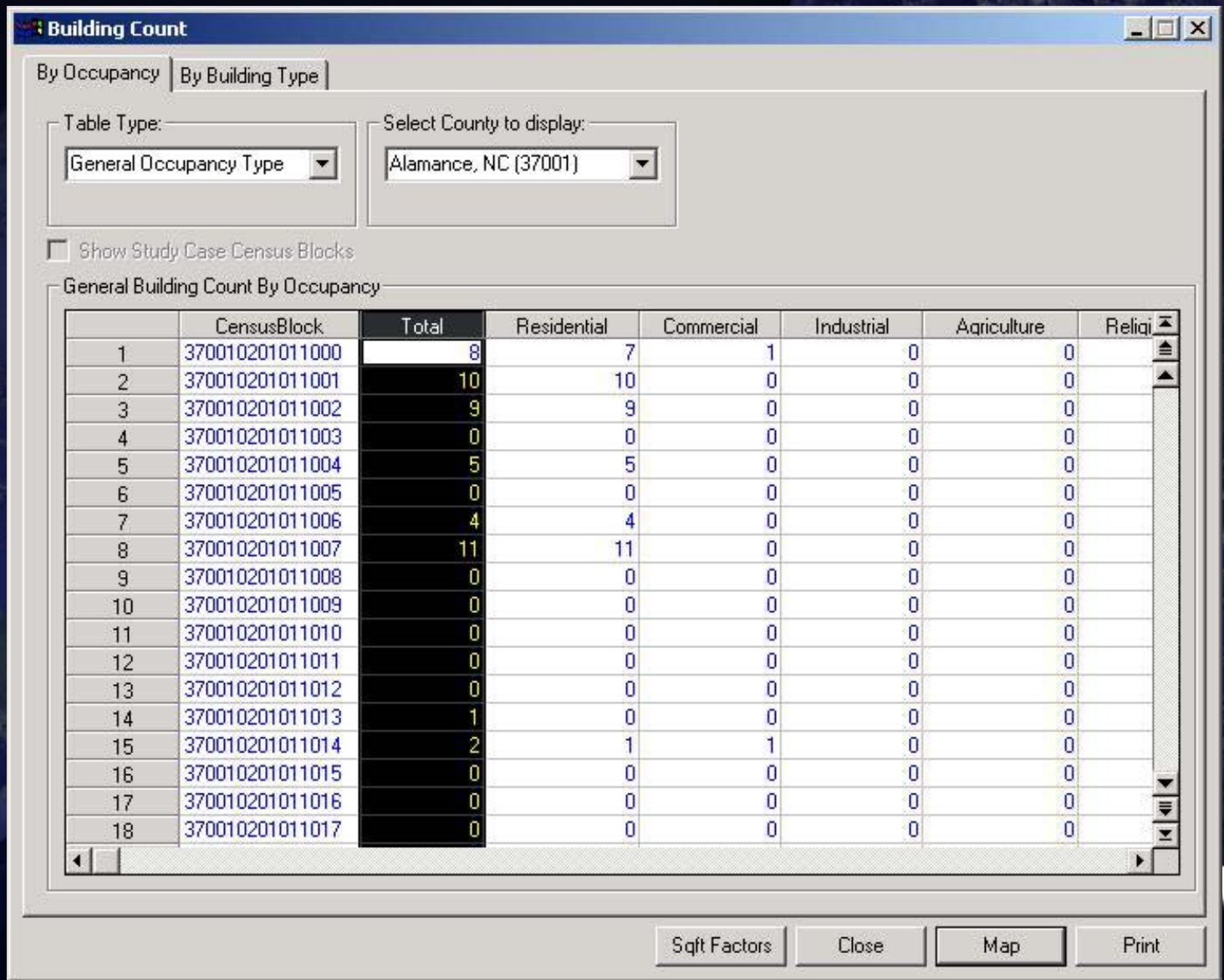


RES1 Square Foot Occupancy Thematic Map



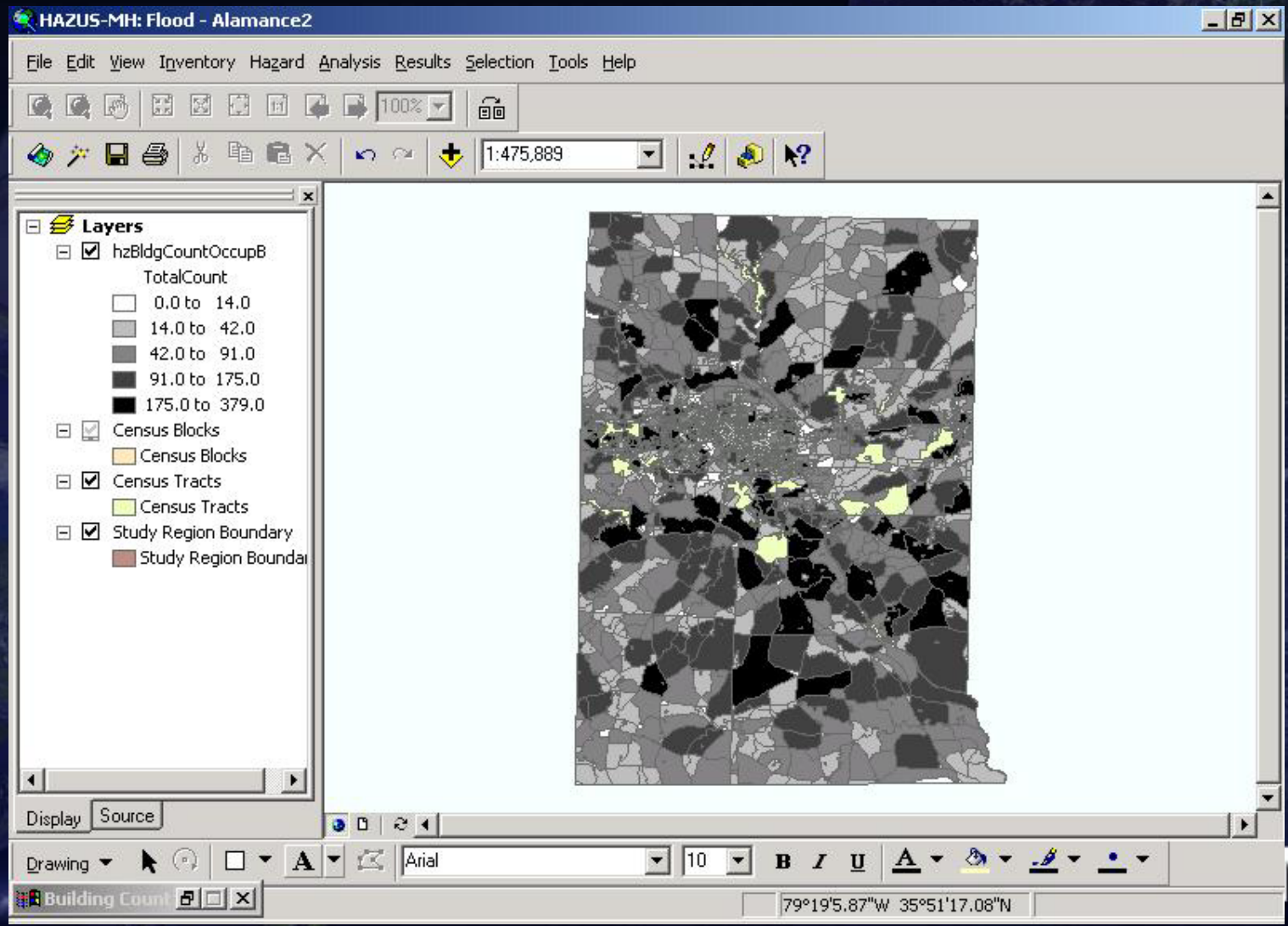
	CensusBlock	RES1	RES2	RES3A	RES3B	RES3C
1	370010201011000	1.97	1.61	7.28	3.41	4.37
2	370010201011001	2.63	2.15	9.70	4.55	5.82
3	370010201011002	2.46	2.01	9.10	4.26	5.46
4	370010201011003	0.00	0.00	0.00	0.00	0.00
5	370010201011004	1.64	1.34	6.06	2.84	3.64
6	370010201011005	0.00	0.00	0.00	0.00	0.00
7	370010201011006	0.99	0.81	3.64	1.71	2.18
8	370010201011007	2.96	2.42	10.91	5.12	6.55
9	370010201011008	0.16	0.13	0.61	0.28	0.36
10	370010201011009	0.00	0.00	0.00	0.00	0.00
11	370010201011010	0.00	0.00	0.00	0.00	0.00
12	370010201011011	0.00	0.00	0.00	0.00	0.00
13	370010201011012	0.00	0.00	0.00	0.00	0.00
14	370010201011013	0.00	0.00	0.00	0.00	0.00
15	370010201011014	0.00	0.00	0.00	0.00	0.00
16	370010201011015	0.00	0.00	0.00	0.00	0.00
17	370010201011016	0.00	0.00	0.00	0.00	0.00
18	370010201011017	0.00	0.00	0.00	0.00	0.00
19	370010201011018	0.00	0.00	0.00	0.00	0.00
20	370010201011019	0.00	0.00	0.00	0.00	0.00

Selecting Data to Map

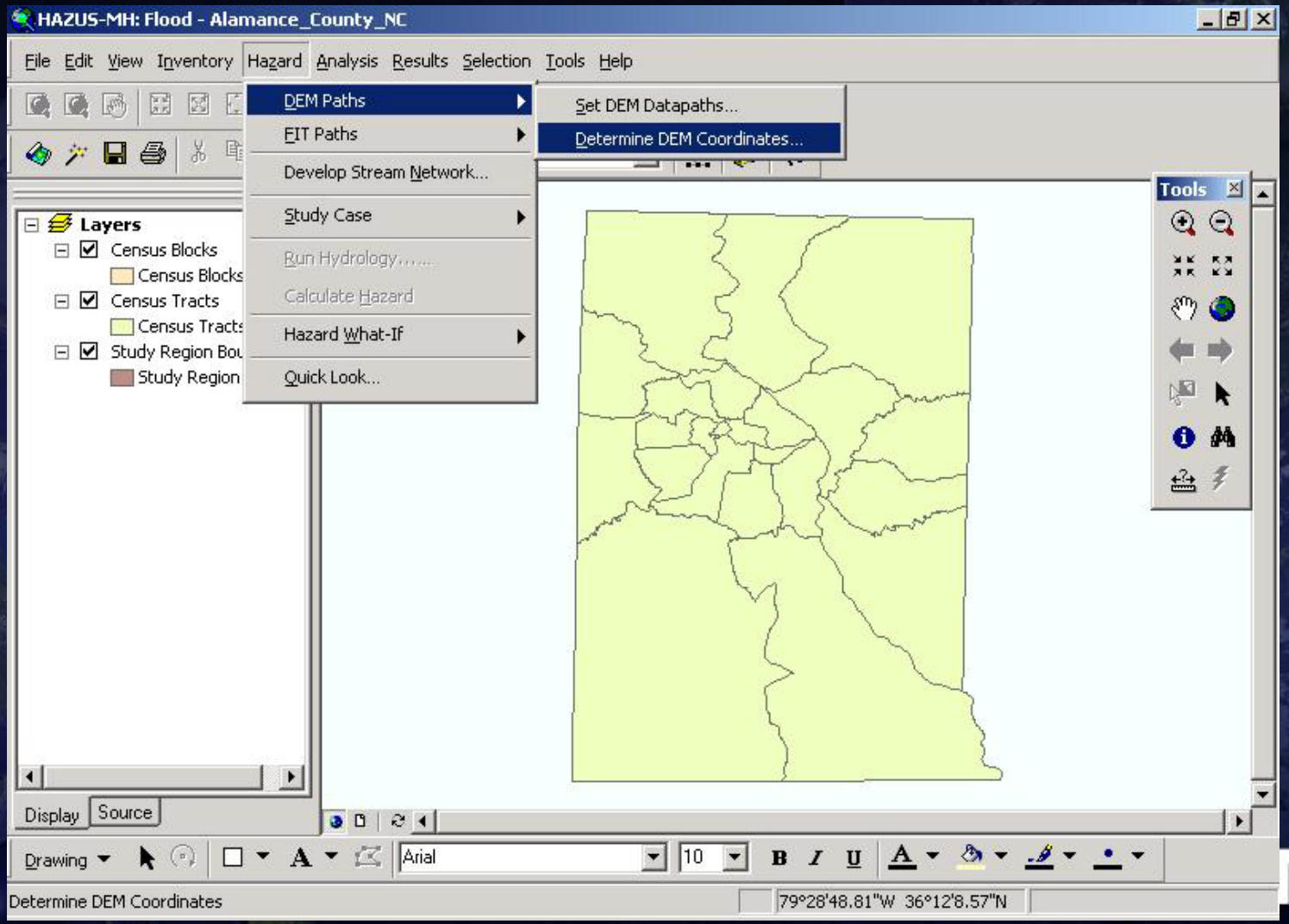


	CensusBlock	Total	Residential	Commercial	Industrial	Agriculture	Religi
1	370010201011000	8	7	1	0	0	
2	370010201011001	10	10	0	0	0	
3	370010201011002	9	9	0	0	0	
4	370010201011003	0	0	0	0	0	
5	370010201011004	5	5	0	0	0	
6	370010201011005	0	0	0	0	0	
7	370010201011006	4	4	0	0	0	
8	370010201011007	11	11	0	0	0	
9	370010201011008	0	0	0	0	0	
10	370010201011009	0	0	0	0	0	
11	370010201011010	0	0	0	0	0	
12	370010201011011	0	0	0	0	0	
13	370010201011012	0	0	0	0	0	
14	370010201011013	1	0	0	0	0	
15	370010201011014	2	1	1	0	0	
16	370010201011015	0	0	0	0	0	
17	370010201011016	0	0	0	0	0	
18	370010201011017	0	0	0	0	0	

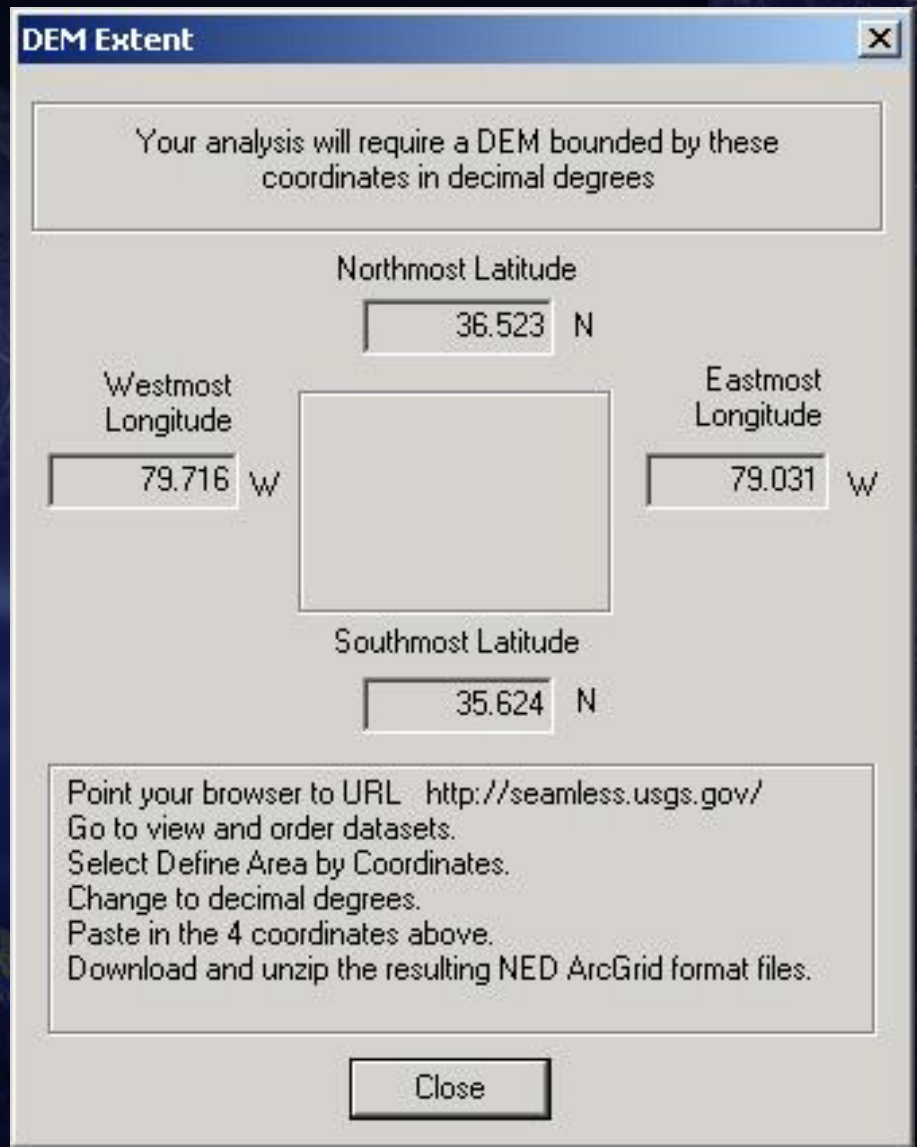
Mapped Data


HAZUS-MH: Flood - Alamance2
File Edit View Inventory Hazard Analysis Results Selection Tools Help
1:475,889
Layers
hzBldgCountOccupB
TotalCount
0.0 to 14.0
14.0 to 42.0
42.0 to 91.0
91.0 to 175.0
175.0 to 379.0
Census Blocks
Census Blocks
Census Tracts
Census Tracts
Study Region Boundary
Study Region Boundar
Display
Source
Drawing
Arial
10
Building Count
79°19'5.87"W 35°51'17.08"N

Hazard and DEM Paths Menus



Coordinates for Downloading USGS DEM Files



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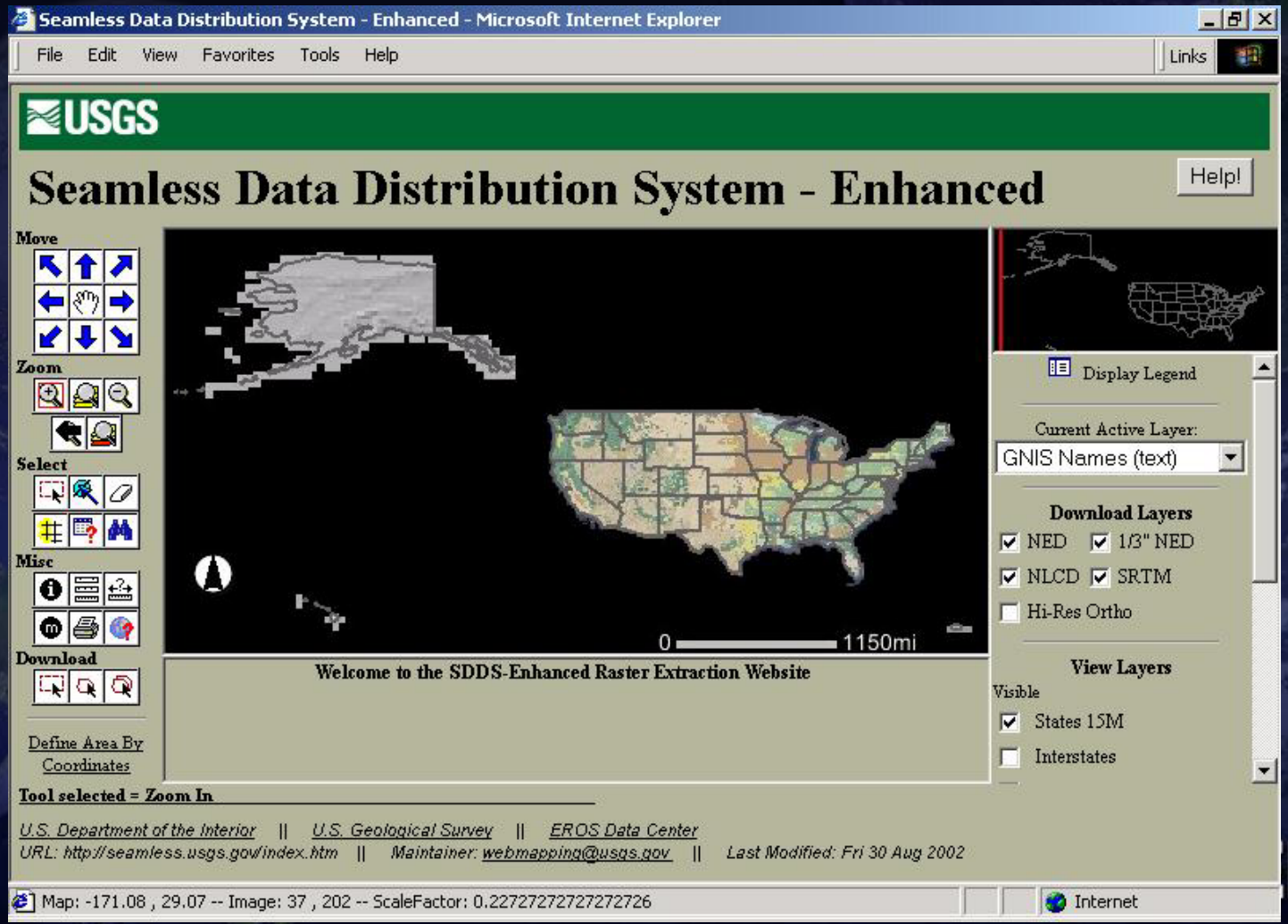
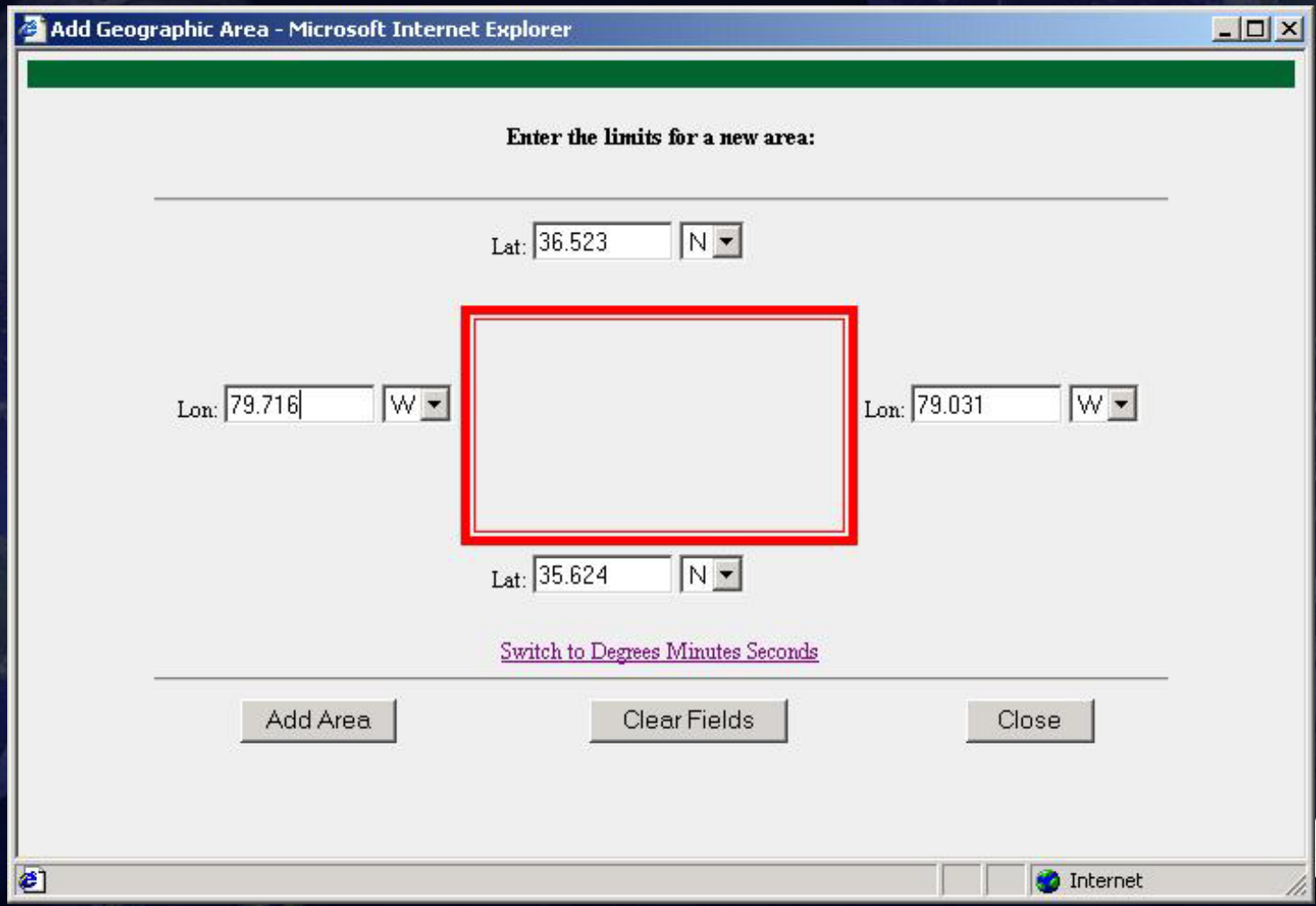
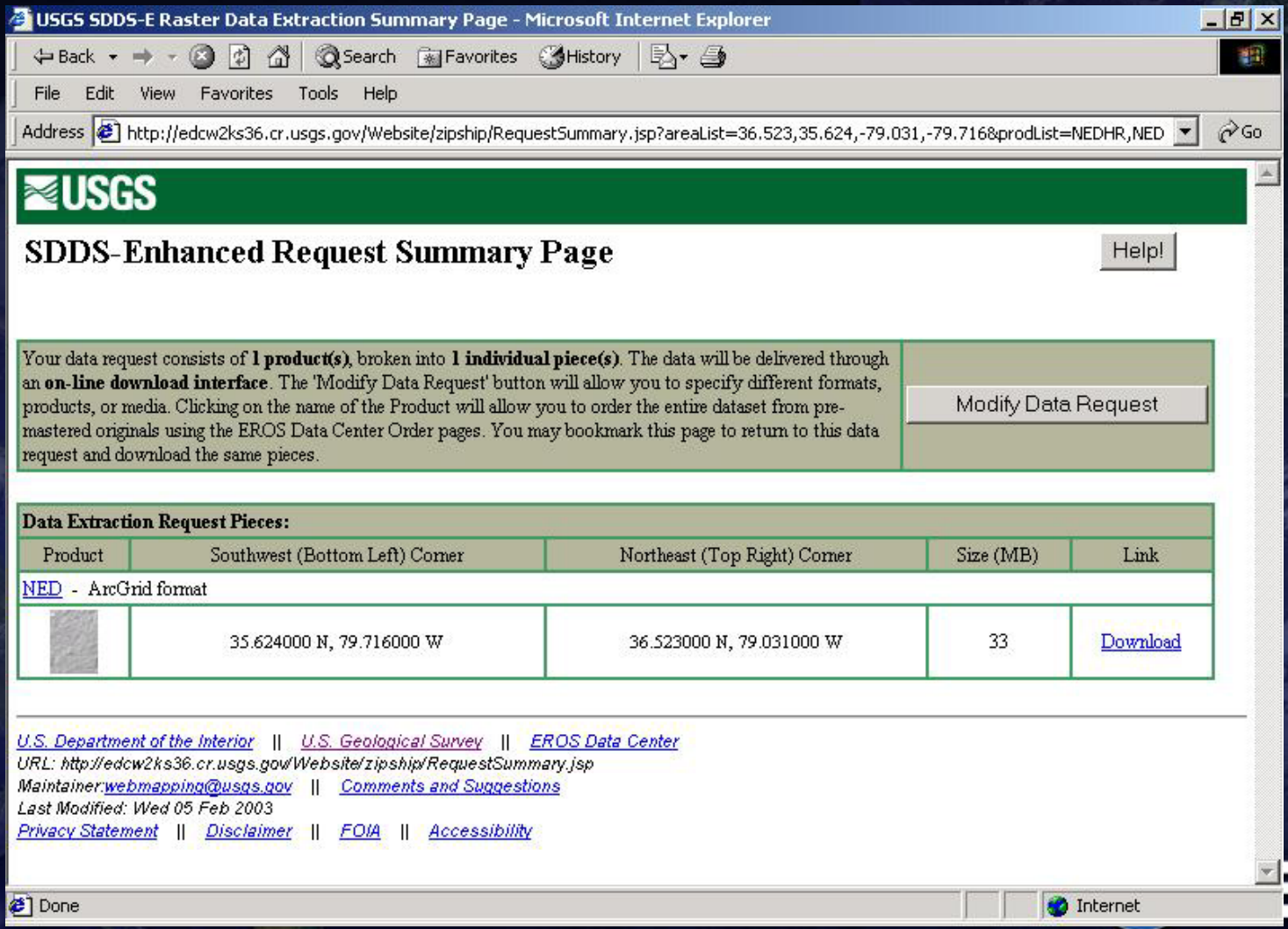
USGS Web Page for Seamless Data Distribution System



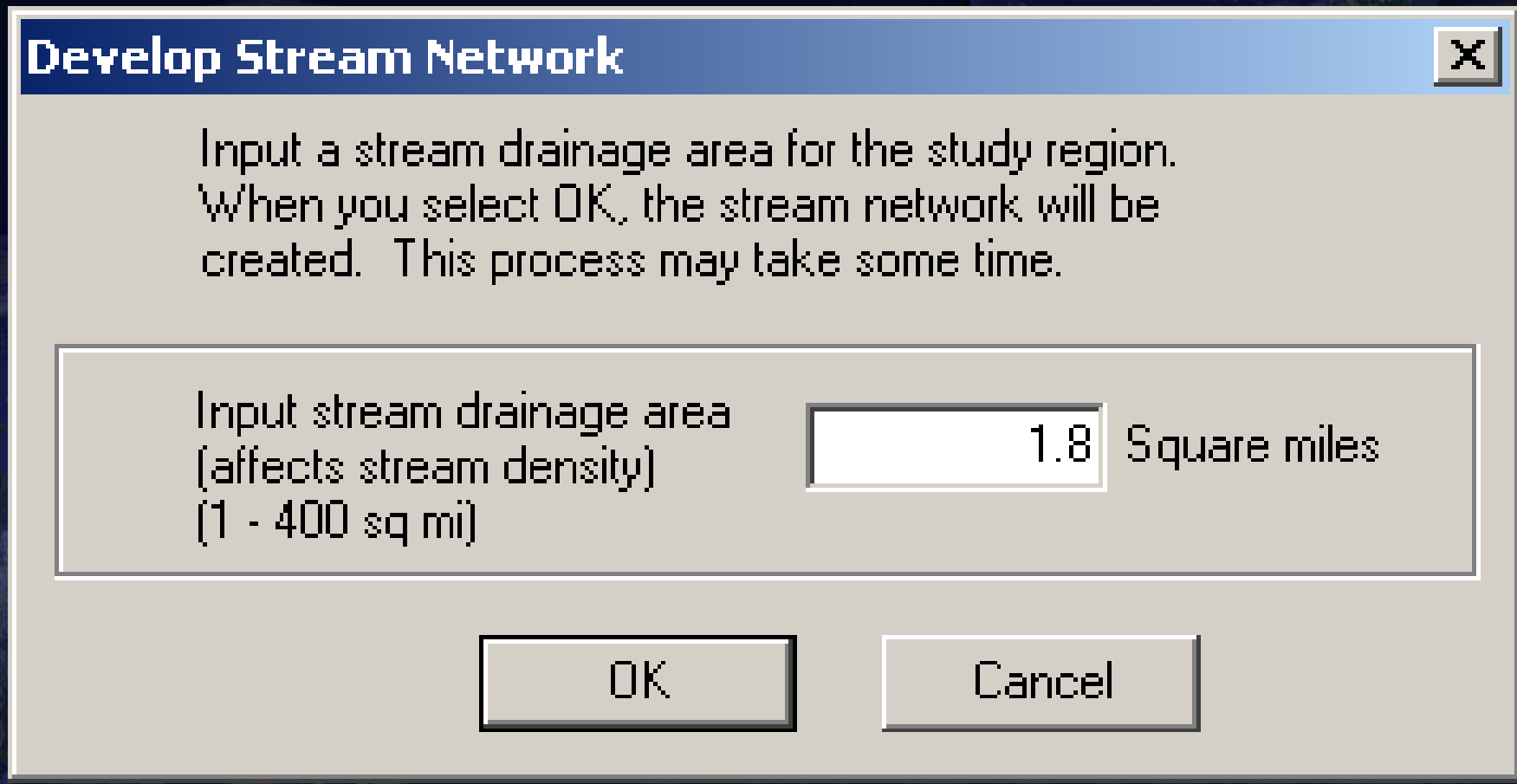
USGS Web Page Defining Geographic Area for DEM Data



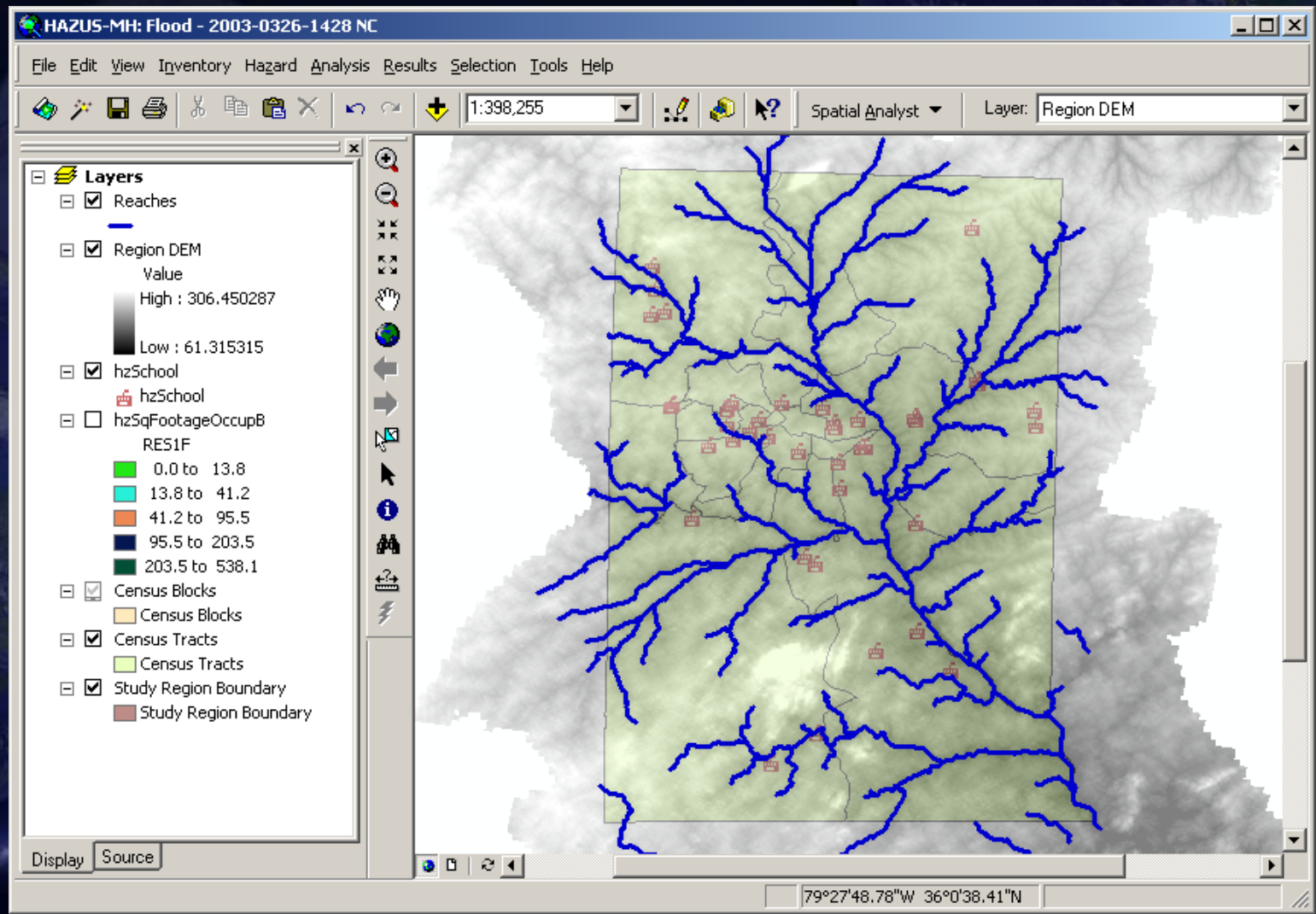
Download Page for USGS DEM Data



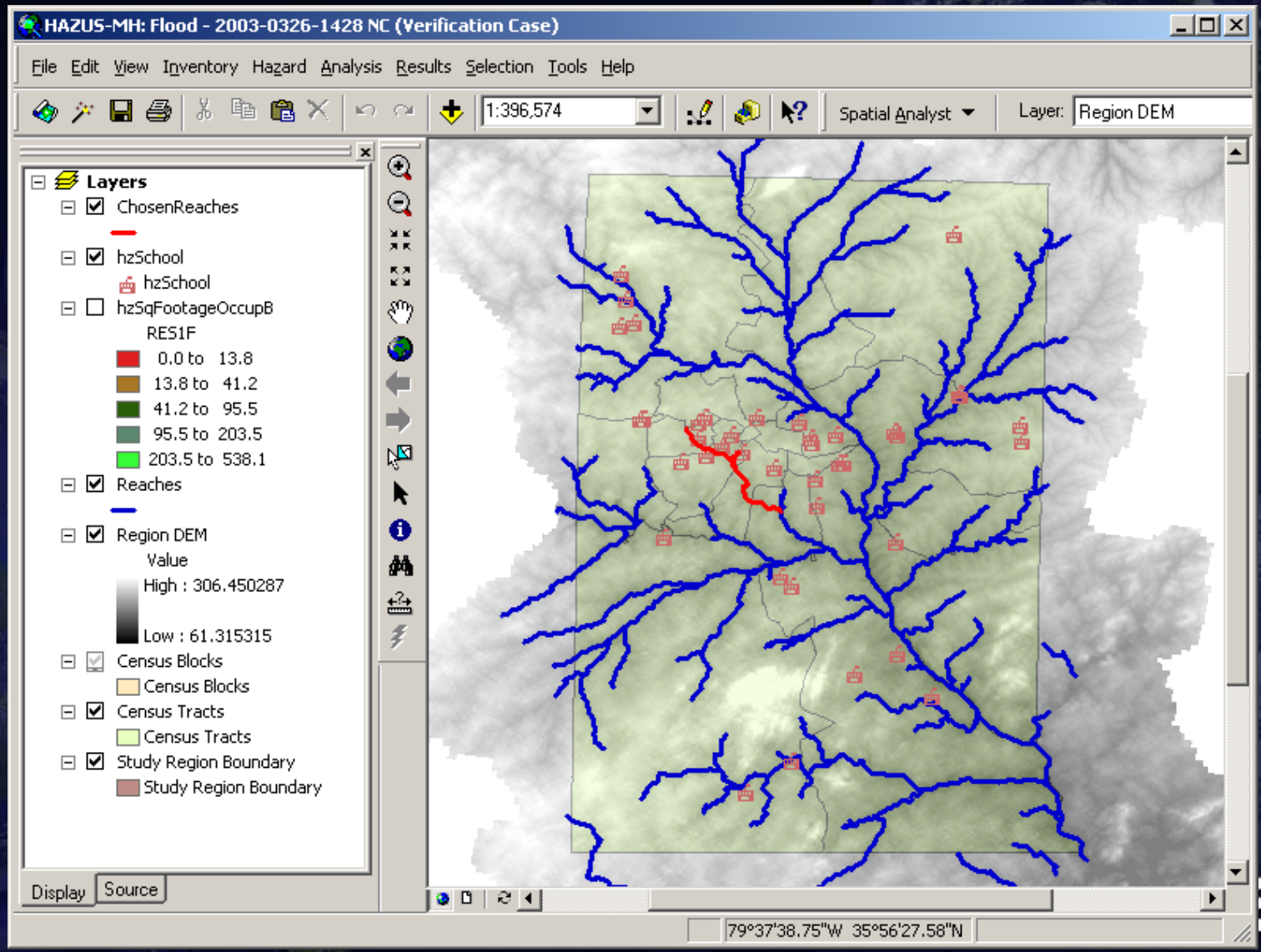
Developing a Stream Network



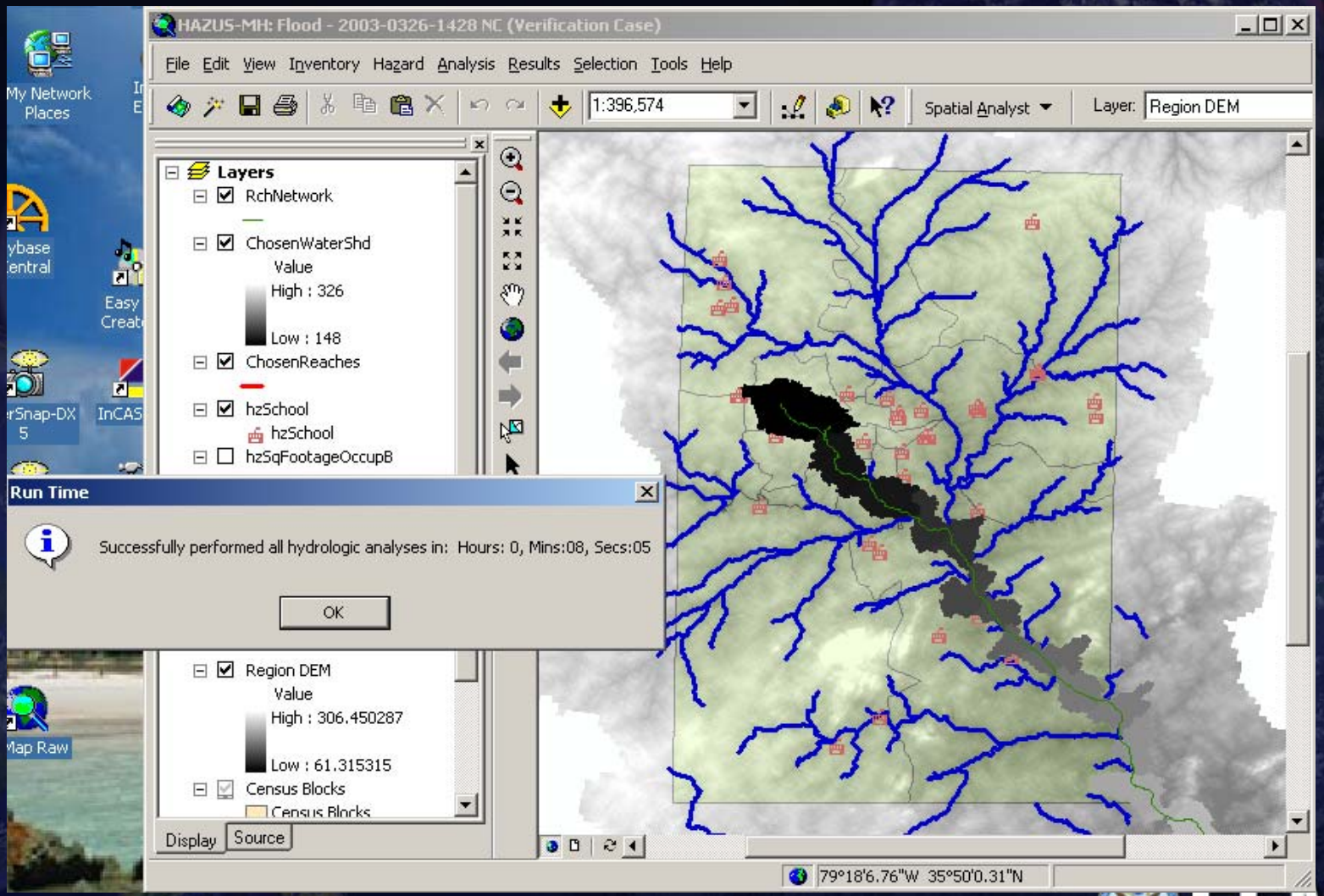
ArcMap Display of Completed Stream Network



Stream Network – Selected Reaches



Hydrologic Analysis



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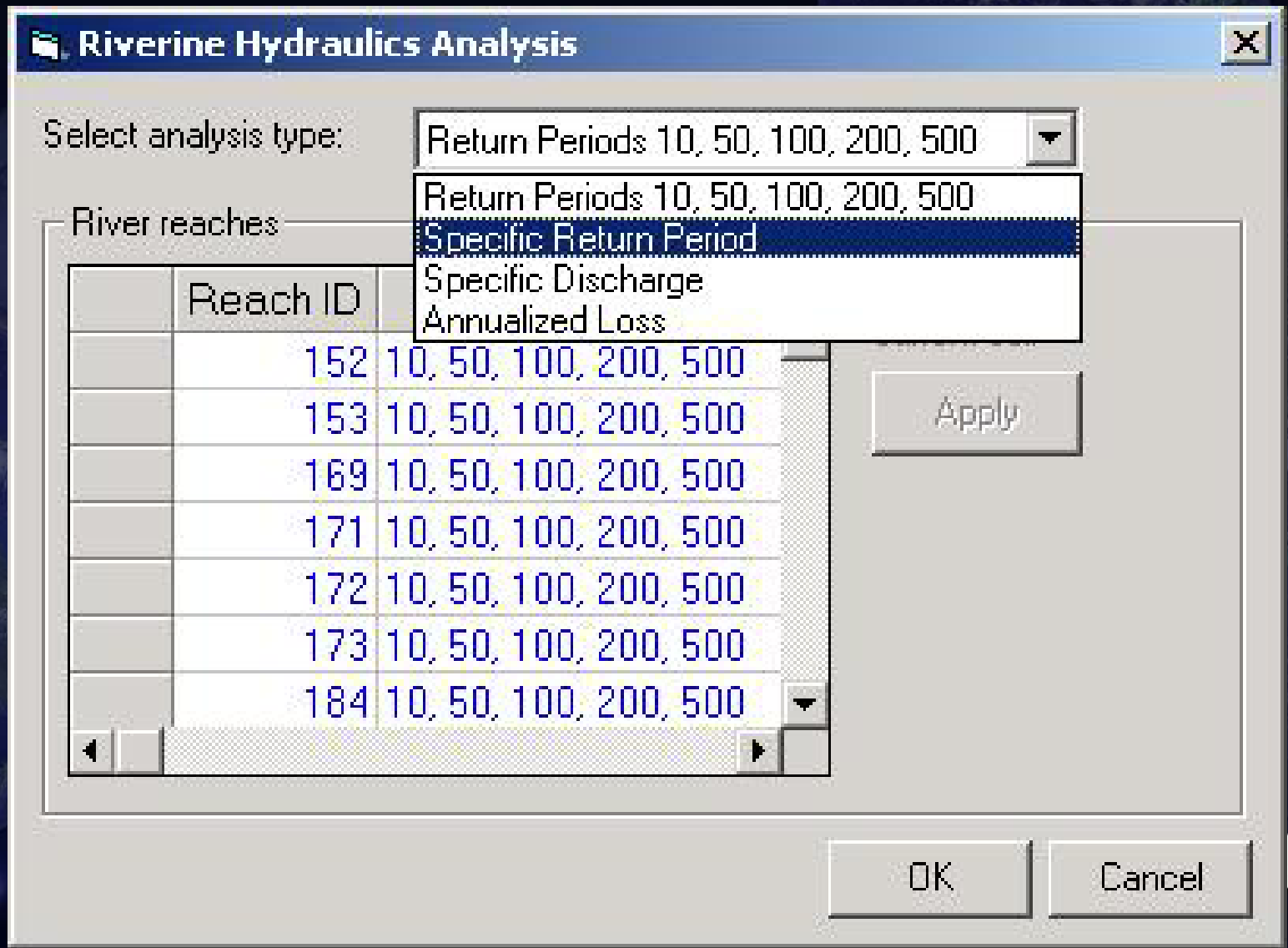
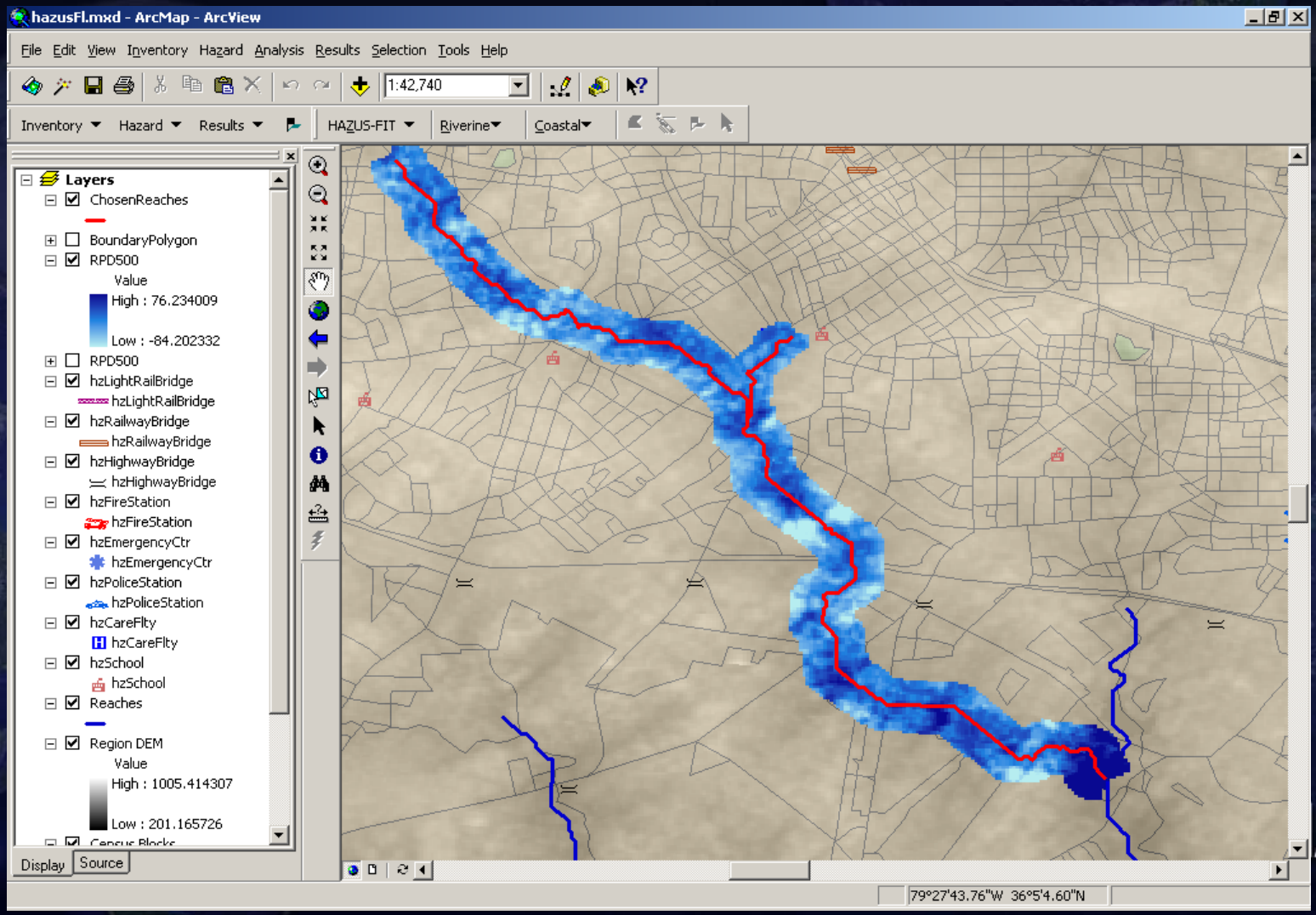
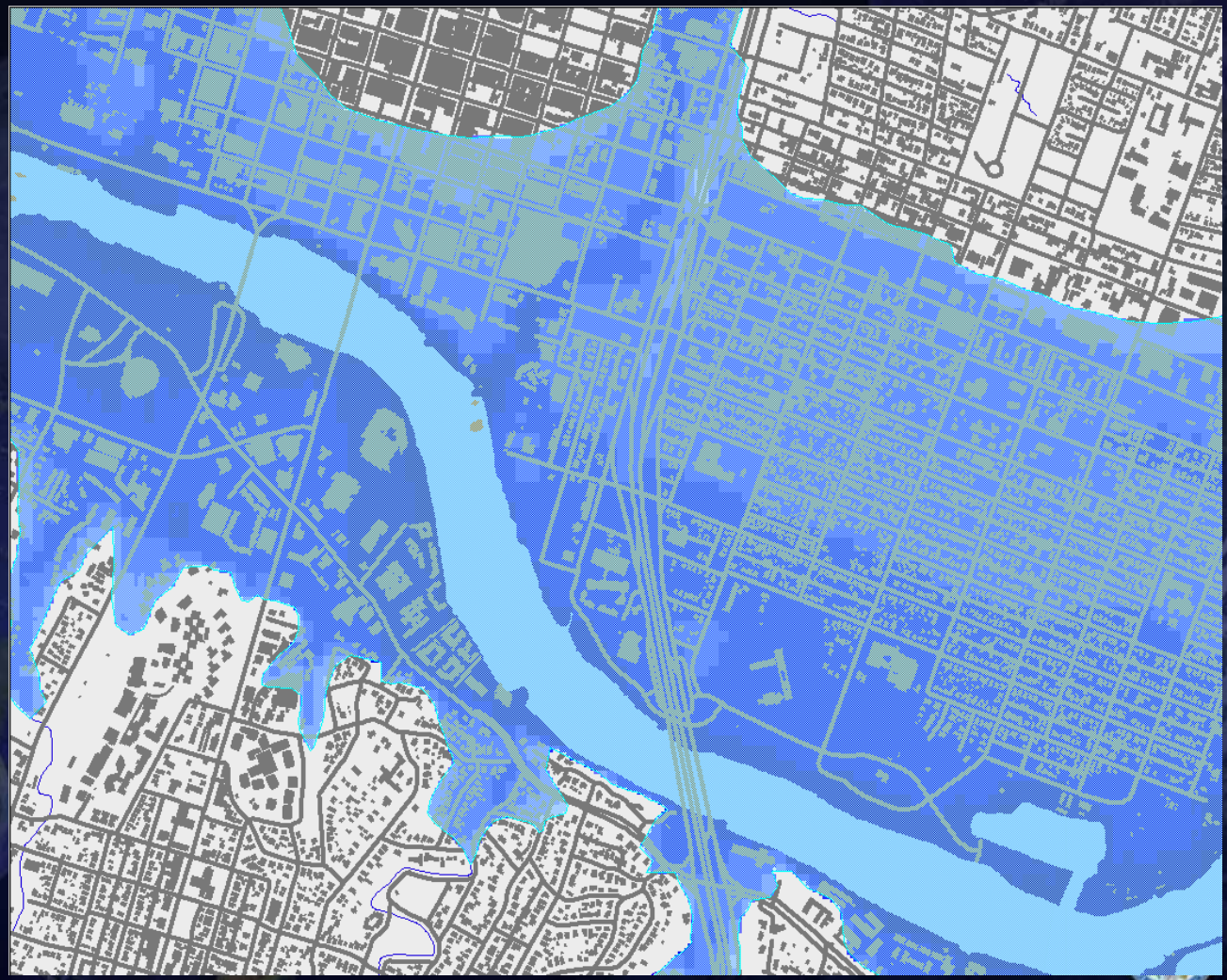
Calculate Hazard Window



Flood Depth Grid For A 500-year Flood



Flood Inundation Output



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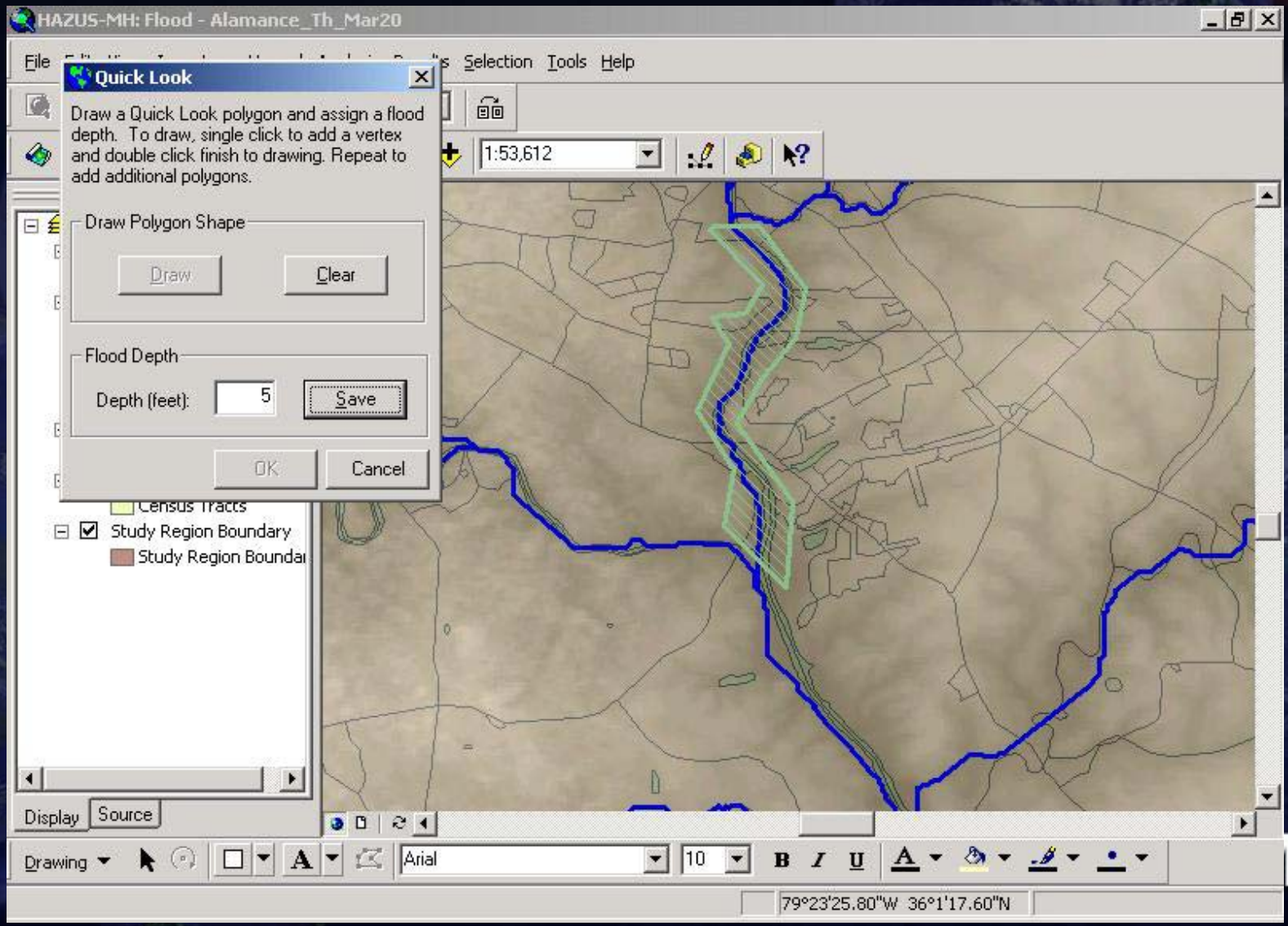
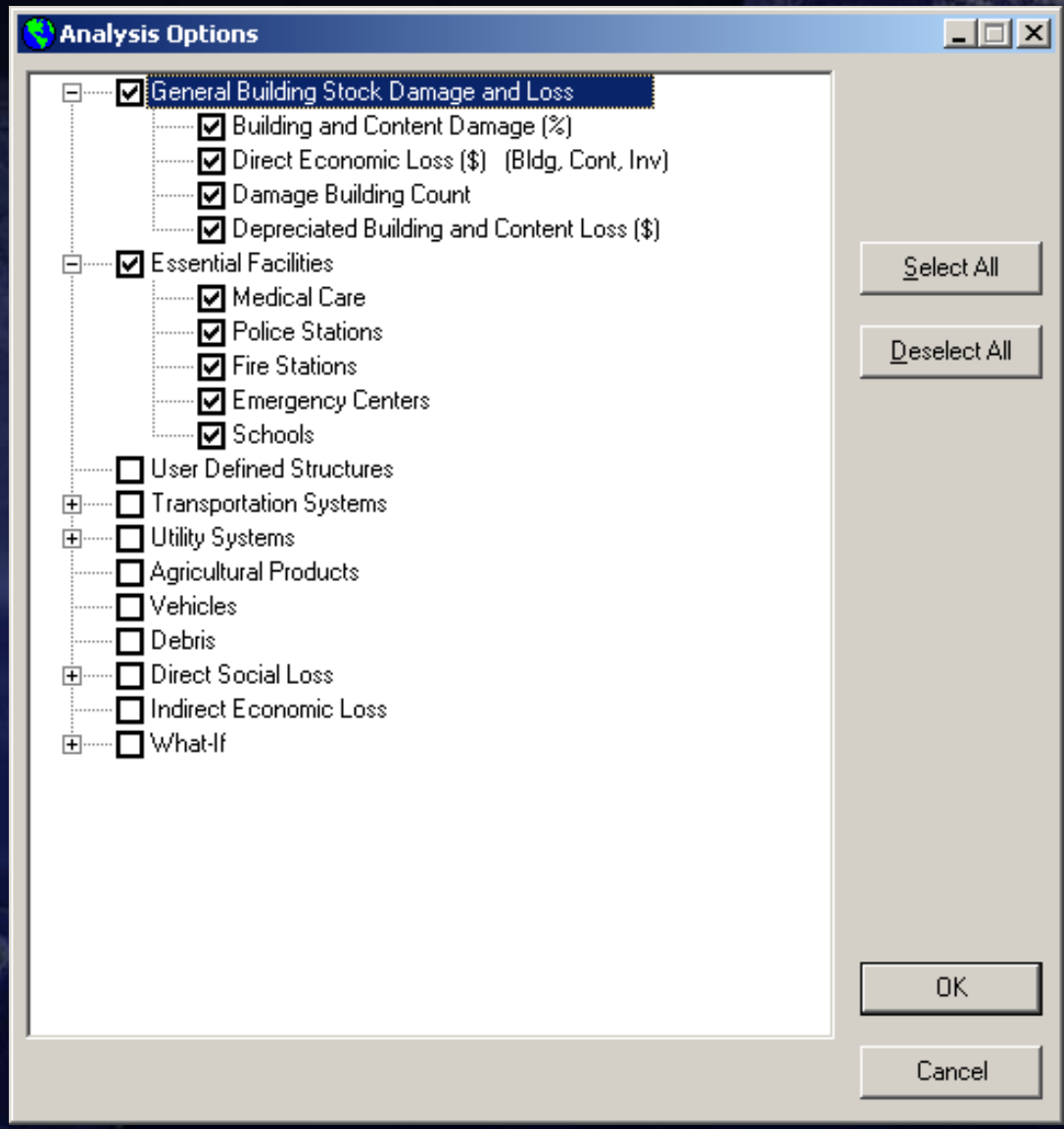
Drawing a Polygon for Quick Look



Available Loss Analysis Options



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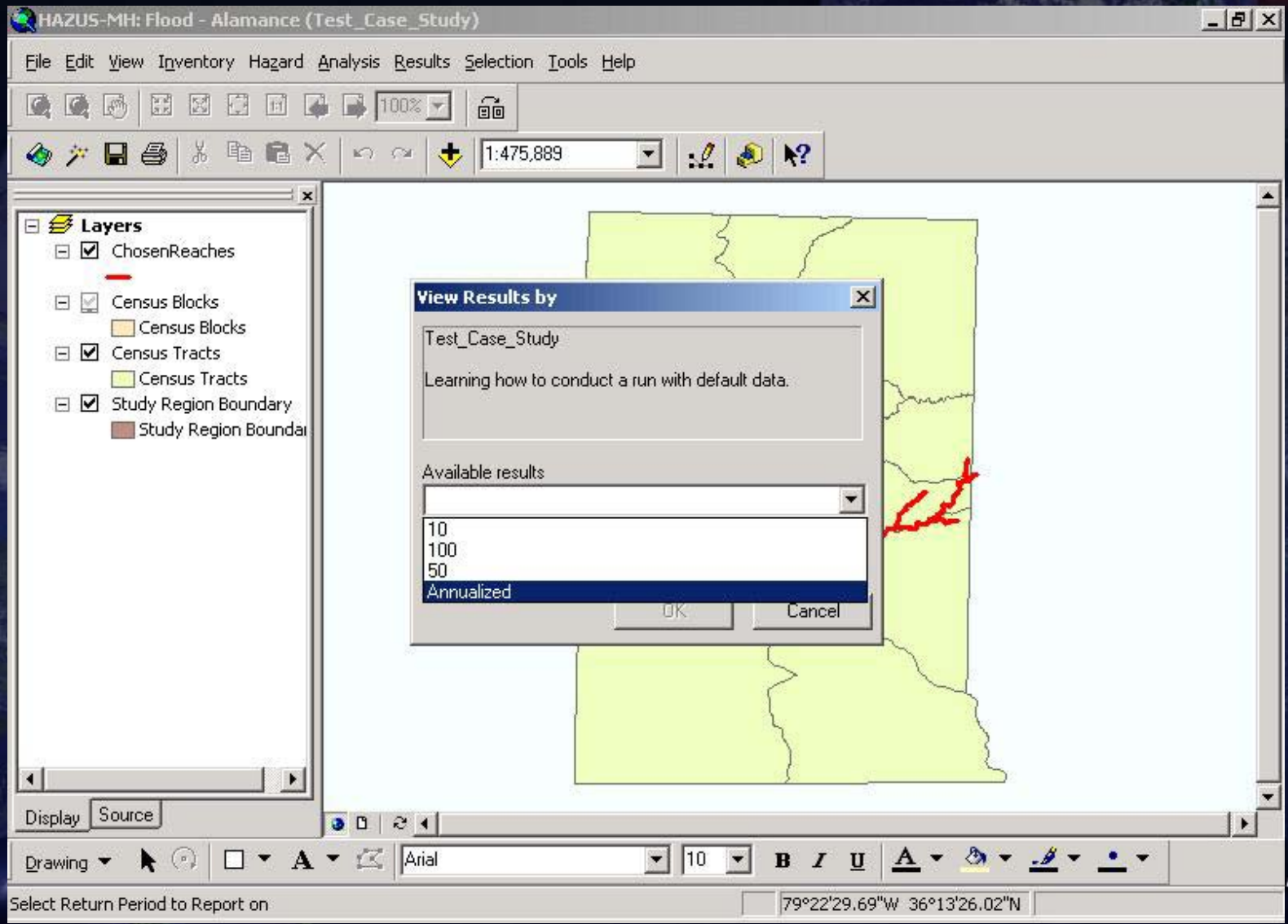
Selecting Available Results to View



Flood Hazard Risk Assessment Output

Flood Loss Estimates				
	100 Year		500 Year	
Occupancy Class	Count	Value	Count	Value
Residential	15942	616,619,008	19,583	808,068,992
Commercial	342	185,024,992	422	229,650,000
Government	36	3,957,430	44	6,353,330
Industrial	63	7,956,760	93	9,182,040
Utility	2	146,601	3	375,489
Total	16,385	813,704,791	20,145	1,053,629,851

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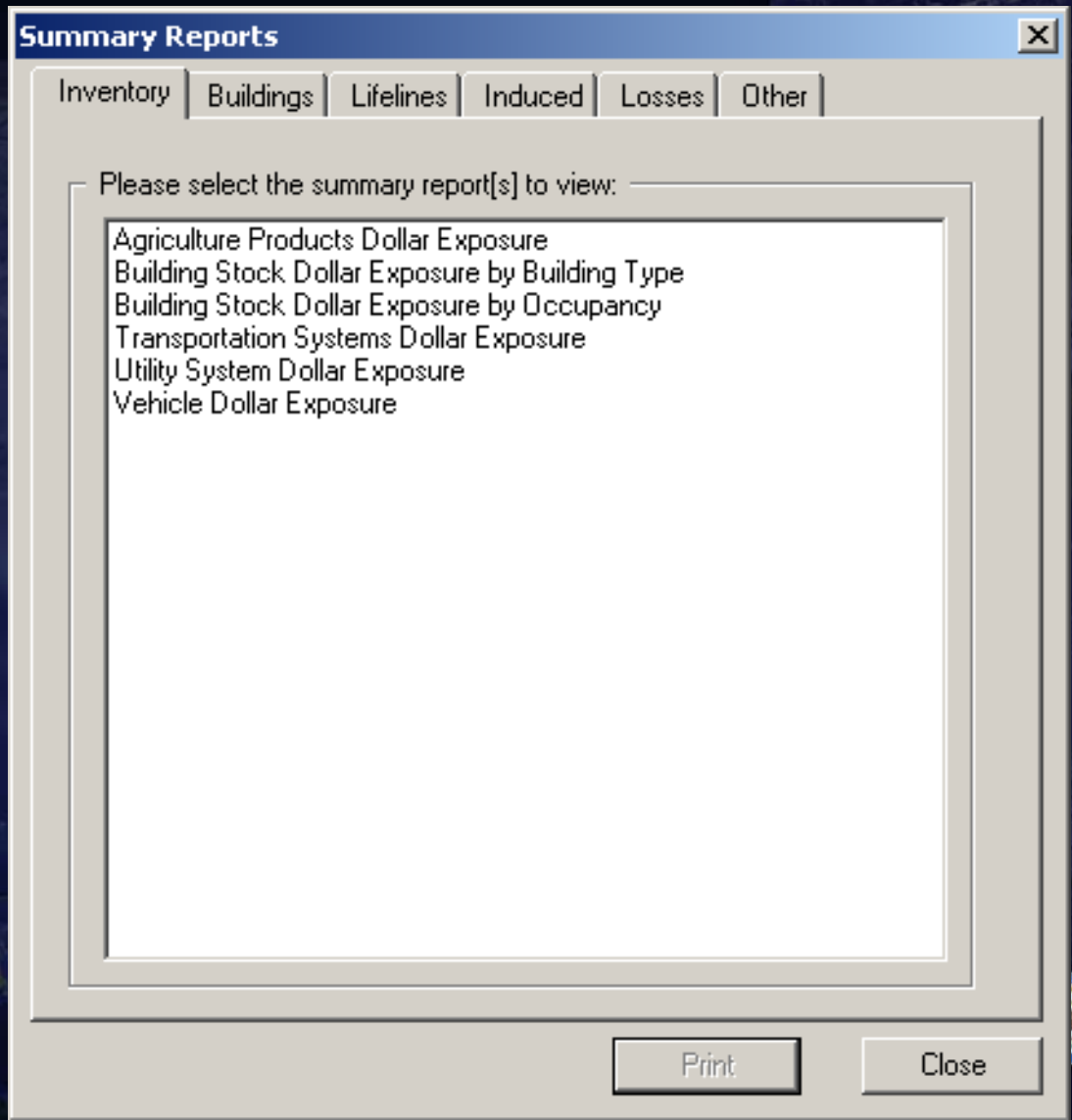
Available Summary Reports



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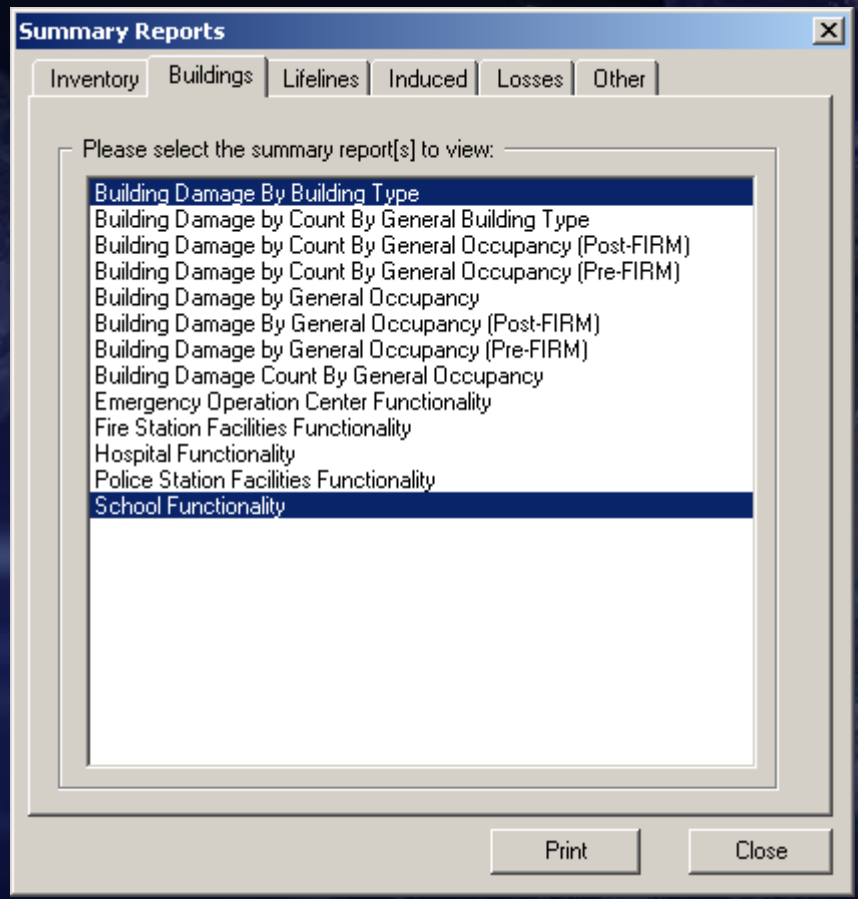
Available Summary Reports (continued)



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HAZUS-MH Breakout Workshop Agenda

- HAZUS-MH Overview
- Software Demonstration
- **University Roles in Supporting Implementation**
- Education opportunities

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Technical Support Opportunities

- Local and state mitigation planning support
- Resource center for HAZUS-MH users
- Technical advisory role for emergency management planning, GIS, engineering aspects

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State and Local Mitigation Plan Requirements

- Description of the planning process - HAZUS can support
- Risk assessment - HAZUS is tool
- Mitigation strategy - HAZUS is tool
- Coordination (state plan)
- Process for plan maintenance - HAZUS can support
- Process for plan adoption
- Assurances (state plan)

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Service Learning Opportunities

- Support initial data collection for local inventory development
- Provide GIS support for risk assessment and mitigation planning
- Provide engineering and planning support for development of mitigation measures
- Technical support for level 2 and 3 risk and mitigation analysis

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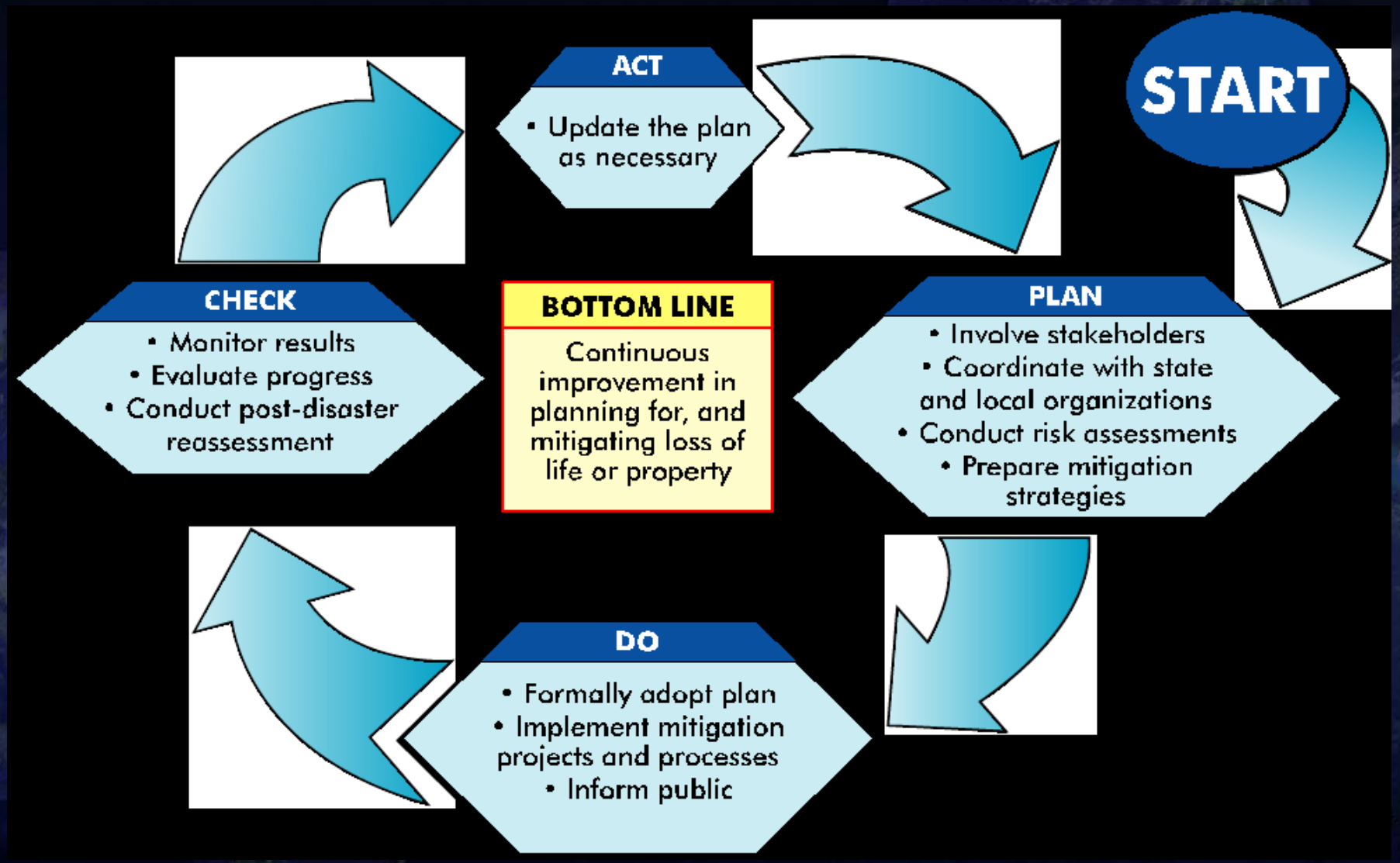
Mitigation Planning is Continuous Process



Support to HAZUS MH Users

- Provide support to understanding hazards and their potential impact on the community
- Serve as data and mapping repository for HAZUS MH regional users
- Provide technical training support for HAZUS MH and its applications (e.g. mitigation planning, hazard risk assessment, GIS tools)
- Participation in Region HAZUS-MH User Groups

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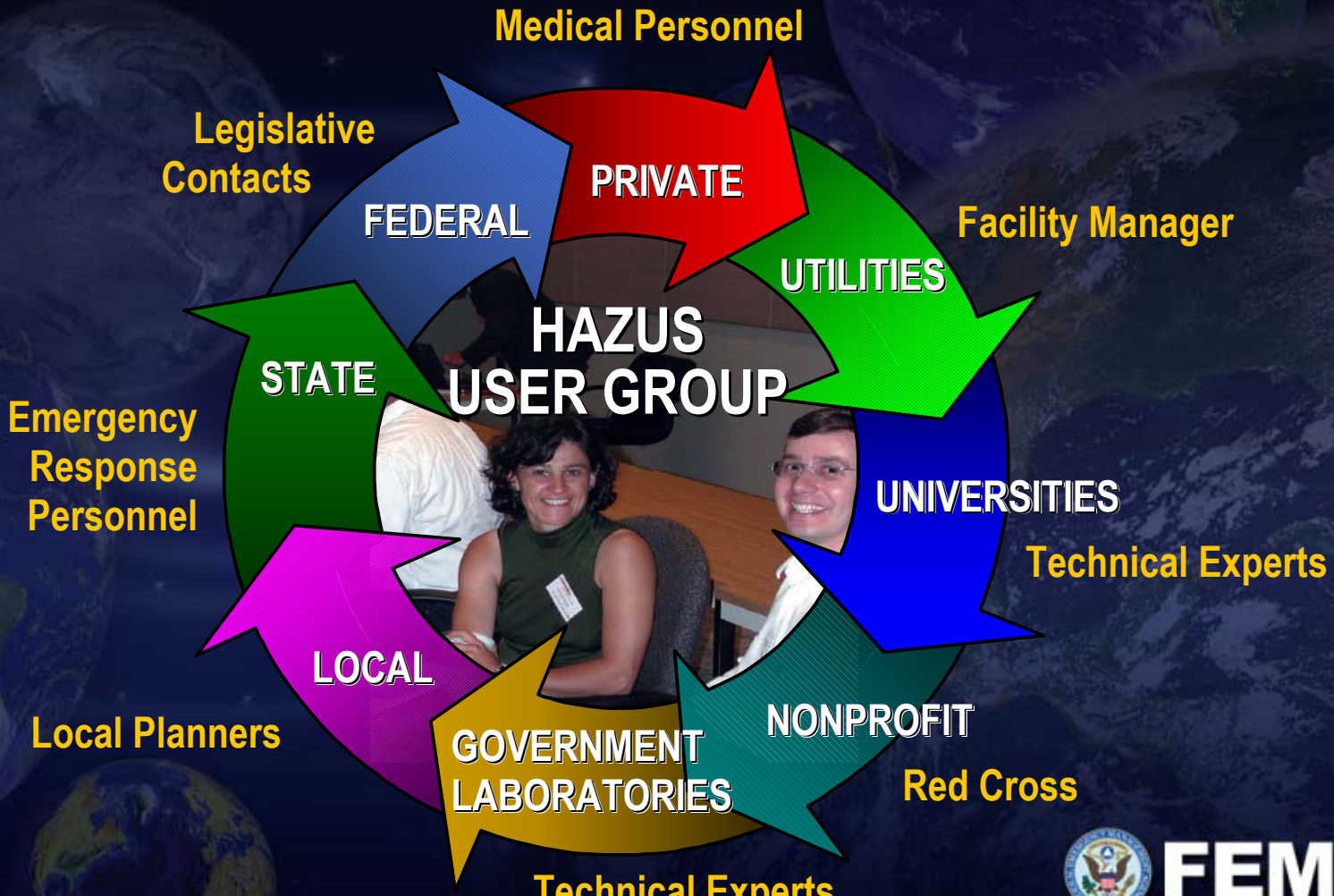
Collaborative Support for HAZUS User Groups



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Higher Education/Government Collaborative Example

- Indiana State Emergency Management Agency (SEMA) recognizes need for providing HAZUS-MH support to communities
- SEMA/Polis Center at IUPUI Established Collaborative Program
- Polis Center provides GIS training and will support training for GIS uses of HAZUS-MH
- Disaster Mitigation Act (DMA 2000) funding to state will be source for IUPUI training support

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HAZUS-MH Breakout Workshop Agenda

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Use of HAZUS-MH Tools and Techniques

- Graduate level applications
  - Emergency management – e.g. hazard profiling and risk assessment
  - Geography – e.g. mapping applications for emergency planning
  - Planning – e.g. zoning and building ordinances for hazard mitigation
  - Engineering – e.g. basic engineering analysis and modeling parameters
- Undergraduate level applications

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HAZUS-MH Summary

- Natural hazard risk assessment tool integrating
  - Standardized engineering analysis and loss estimation models
  - National databases and local data integration
  - GIS platform for data analysis and presentation
- Supports variety of emergency planning and management activities
  - Preparing for, and mitigating potential impacts of natural hazards
  - Planning for, and responding to, natural hazard events
  - Recovering from natural disasters

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HAZUS-MH Summary (continued)

- Higher education institutions can play a key role
  - Providing service support to local and regional organizations
  - Resource center and repository
  - Integrating HAZUS-MH applications into curriculum
- Unique opportunities for multidisciplinary collaboration

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HAZUS-MH Information

Visit the HAZUS website:
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