

EERI Workshop
Mitigation/HAZUS

Utah Earthquake Scenario Initiatives

HAZUS Risk Assessment Tool

- Earthquake, flood and hurricane wind modules
- Developed in conjunction with the National Institute of Building Sciences
- Runs on ESRI ArcGIS 9.2 platform
- Largest extension of ArcGIS
- Over 200 data layers – all open source
- Results identify specific and general vulnerabilities for mitigation strategies, numbers increase awareness and trigger action

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HAZUS Applications

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HAZUS/ShakeMap Demonstration Pilot: Demonstrate Integration of Two Major NEHRP Programs

- Salt Lake and Seattle
- Facilitate links between ShakeMap and Emergency Management community
- Develop suite of 10 map products to use in support of scenarios, support mitigation applications, and use in future earthquakes

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RISK COMMUNICATION

Utah has not had its big earthquake historically.

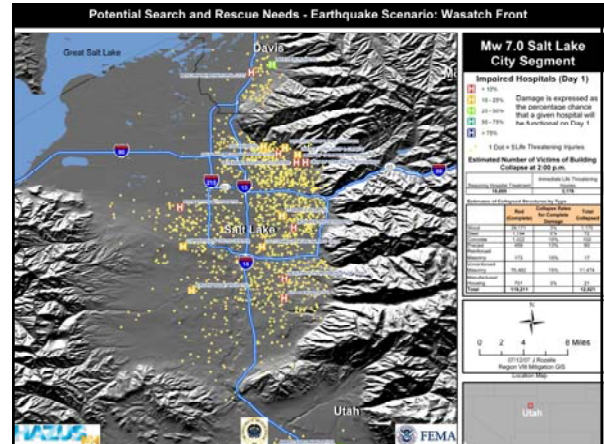
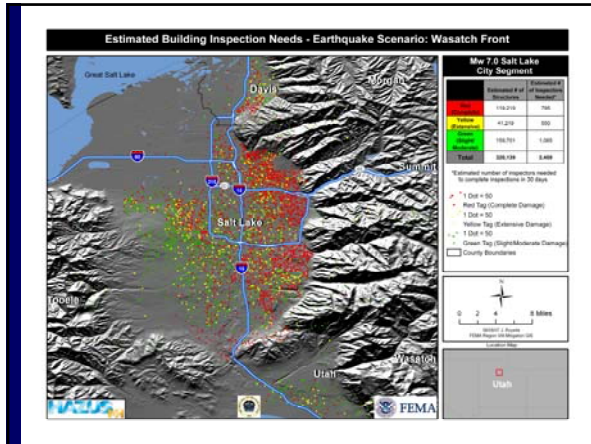
26 recent paleo-earthquakes, Mw ~7

Segments may rupture individually or together

HAZUS/ShakeMap in Utah

There are currently 18 UofU ShakeMap Scenarios throughout Utah—Significant hazard and inventory improvements

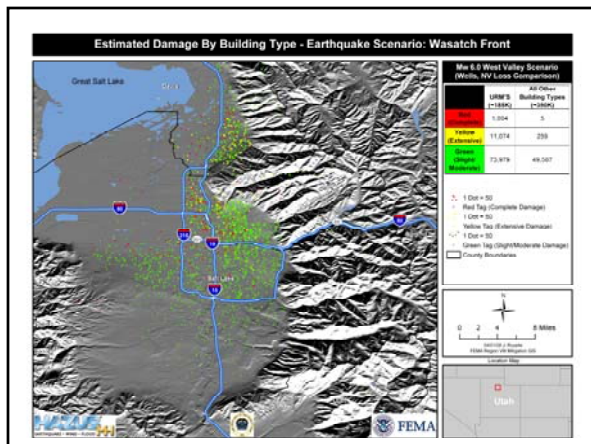
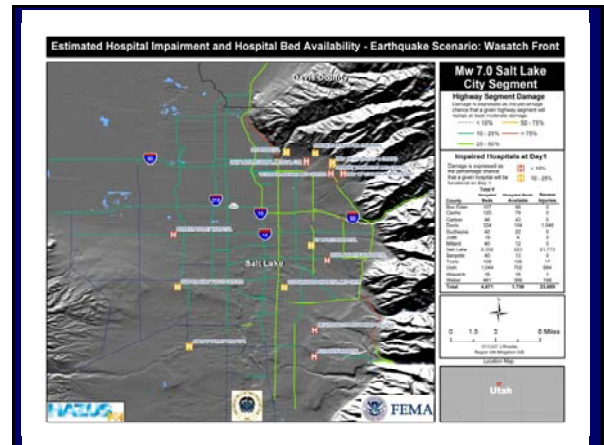
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Translating Results to Needs

URBAN SEARCH & RESCUE GAP ANALYSIS-Mw 7.0 SALT LAKE SEGMENT		
Resource	Metric	Required
Total number of USAR Type I Task Forces required? (Approximately 70 members, trained & equipped for light frame, heavy wall, heavy floor and concrete-steel construction (heavy reinforced concrete)).	Number of Task Forces Trained Personnel	11 778
Total number of USAR Type II Task Forces required? (Approximately 32 members, trained & equipped for light frame, heavy wall, heavy floor and concrete-steel construction.)	Number of Task Forces Trained Personnel	3 210
Total number of Collapse SAR Type III Teams required? (Approximately 22 members, trained & equipped for light frame construction.)	Number of Teams Trained Personnel	261 18,276
Total number of Collapse SAR Type IV Teams required? (Approximately 6 members, trained & equipped for light frame construction.)	Number of Teams Trained Personnel	15 1,050

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Killer Buildings: URM Related Casualties - Salt Lake Scenario (~185K URMs)

Time of Day	Casualties
Daytime	2,500
Severity 3 & 4* Casualties w/out URMs	2,500
Severity 3 & 4 Casualties w/URMs	8,800
% Casualties Caused by URMs	70%

*Search and Rescue Needs:
 Focus on URMs-concentration of life-threatening injuries
 Concrete-steel debris-USAR's equipment*

**note: Severity 3 and 4 include life-threatening casualties and fatalities, respectively*

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Killer Structure Problem



URMs: More than 70% of severe casualties and loss of life-Wasatch and NMSZ

Unreinforced Masonry Buildings: Don't Play the Odds
Protect Your Community from Earthquake Catastrophes
A Guide for Officials and Others Concerned About Earthquake Safety

Killer Buildings: Scenarios indicate certain types of vulnerable buildings cause most the loss of life

FOUR STEPS TO REDUCE YOUR EXPOSURE

CONDUCT INSPECTION	TAKE STOCK	GET REPAIRS	TAKE ACTION
<p>THE INSPECTION</p> <p>Inspectors should look for cracks and other signs of damage. They should also check for loose masonry, crumbling mortar, and other signs of deterioration. They should also check for signs of water damage, which can weaken masonry.</p>	<p>TAKE STOCK</p> <p>Inspectors should also check for signs of damage to other parts of the building, such as the roof, foundation, and electrical system. They should also check for signs of mold and other health hazards.</p>	<p>GET REPAIRS</p> <p>Inspectors should recommend repairs to the building owner. They should also recommend that the building owner get a professional engineer to inspect the building and provide a written report on the condition of the building.</p>	<p>TAKE ACTION</p> <p>Inspectors should recommend that the building owner take action to reduce the risk of damage to the building. They should also recommend that the building owner get a professional engineer to inspect the building and provide a written report on the condition of the building.</p>



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Recommended Modeling Priorities

- **Improve Inventory:** Integrate assessor data, essential facilities (building type, occupancy, year built, etc.)
- **Develop Methods for Infrastructure:** Long-span bridges, dams, etc.
- **Assess Cascading Failures (network):** Dams-levees, Port, Power Plants, Pipelines, Hazmat
- **URM Inventory:** accurate numbers drive casualties
- **Develop Additional Scenarios and Incorporate Hazard Maps**



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The End



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