DEVELOPING EFFECTIVE EARTHQUAKE AND TSUNAMI SCENARIOS FOR THE LOCAL GOVERNMENT

TILAMOOK COUNTY EMERGENCY MANAGEMENT

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Scenario Driven Exercises

- Before building a scenario the following elements must be evaluated
  - Review the most current Hazard Analysis
  - Understand where your vulnerabilities are located
  - Use good science and up to date hazard maps
  - Develop realistic scenarios based on science
  - Review local history
  - Write injects that test the local governments capabilities and if possible find weakness in the local plans
  - Run HAZUS Model

UNDERSTAND THE HAZARDS

- Accurate Tsunami Inundation Maps
- Interpretation of Earthquake Scenarios and Hazard Maps should be simple
- Standardation of mapping process and methodology are necessary to validate scenarios
- Tsunami maps need elevation indexing
- Color standards should also be consistent
- Mapping should be updated and validated by best science

Elements Identified in Developing an Earthquake Scenario

- Geo Spatial – Lidar GIS Data
- Geological Data
- Soils and Geotechnical data
- Building Type Inventory
- Lifeline Utilities
- Transportation
- Social and Economic Impacts
- FEMA HAZUZ and Local Hazard Analysis

FEMA HAZUS

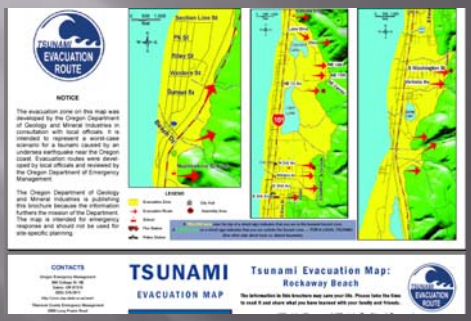
- Run HAZUS model
- Interagency Planning State Department of Geology and Mineral Industries, State Office of Emergency Management, FEMA and local VOAID.
- Verify with History and current Hazard Maps
- Utilize Local Hazard Analysis
- Review Pre-Hazard Mitigation Plan
- Review Local Governments and Private Sector COOP/COG Plans

Mapping Examples and Flawed Hazard Analysis

- Simple Hazard Maps
- Complex Hazard Maps
- Mapping methodology
- Hazard Analysis Methodology
- Lack of Training for the Local Emergency Manager

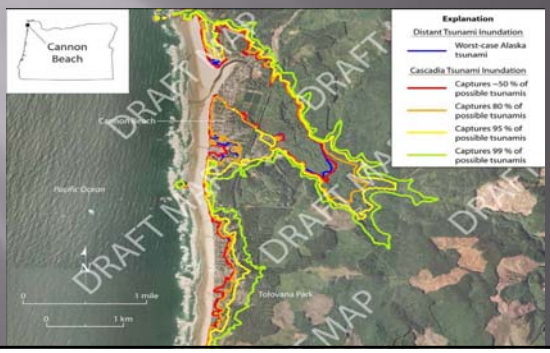
First Adopted Map 1995

Updated Evacuation Maps 1999

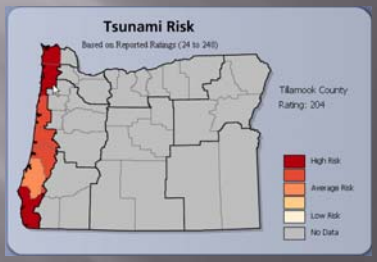


GIS Overlay 2002

Current Draft Map 2008



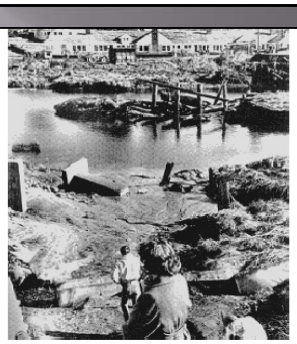
Flawed State Hazard Analysis



Involving The Public & Private Industry in the Planning Process

- Public Outreach Programs
- Chamber of Commerce
- K-12 Education Earth Science
- Service Organizations
- Faith Based Preparedness Workshops
- Tsunami Drills and Full Scale Exercises
- Tsunami Hazard Real Estate Disclosure
- Hotel and Motel Industry Disclosure
- Public Beach Access Tsunami Warning Disclosure

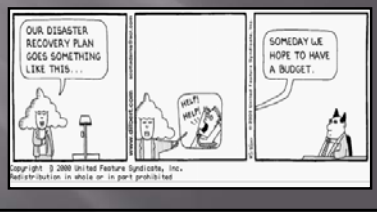
Local History 1964



Tangled debris is all that remains of the 200-foot-long Elk Creek Bridge, which stood at Cannon Beach, Oregon, before being destroyed by a tsunami generated by the disastrous Alaskan earthquake of March 27, 1964. Photo courtesy of The Oregonian.

Local Government Buy-In

- Supported by Elected Body of Government
- Enact local laws, ordinances to prepare for, respond to and recover from Earthquakes and Tsunami's
- Maintain a strong Emergency Management agency to develop good Emergency Operations Plan's and a strong public outreach and exercise program.



Map Adoption by Local Ordinance

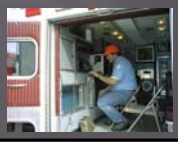
- The Tsunami Inundation Maps should be incorporated into the Local Master Plan at Community Development
- The National Flood Insurance Program needs to reflect our risk of the Tsunami Inundation area as in a high velocity or "V "zone
- The Tsunami Inundation Maps need to be adopted for code enforcement and will need sufficient detail for this purpose.
- The goal is to limit development in these high risk areas, and to mitigate our risk

State and Federal Support

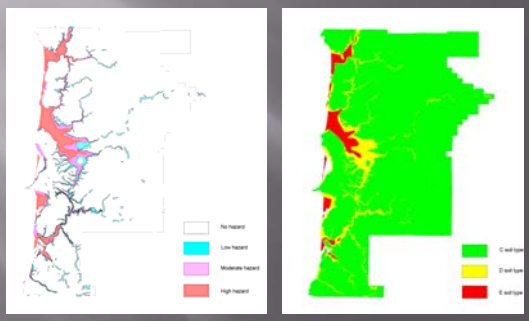
- Provide sufficient funding to research and develop accurate risk maps
- Provide funding to produce large quantities of hazard maps to support local government
- Provide funds for the manufacture of Tsunami Hazard signage and evacuation route and site signage.
- Interagency training and exercise to enhance overall preparedness
- Update FEMA HAZUS model to be more user friendly

Earthquake Scenarios must include Community Alert & Warning Systems

- Tillamook County has 63 sirens located along our coastline and rivers and are tested monthly
- Our County has 3 NOAA Weather Alert Radio Transmitters that are used for all hazard notifications
- State ODOT has supplied AM Transmitters along our coastal highways that provide emergency information when lights are flashing
- Radio Amateur Civil Emergency Service and Amateur Radio Emergency Service
- Connect and Protect is utilized by our schools which is an internet system
- Reverse 9-1-1 System
- NOAA Buoy Warning System
- Alert and Warning Systems should be used with the actual alert tones so the public can recognize the hazard



Scenario Planning Maps



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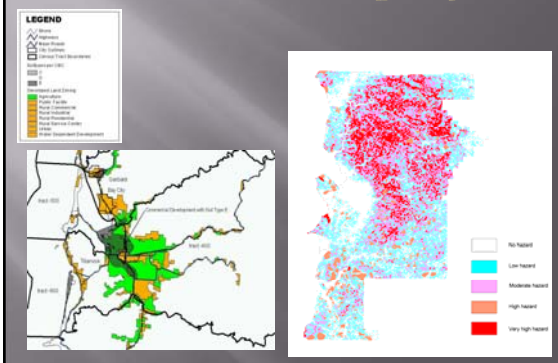

Earthquake Scenarios

- Earthquake Scenarios
- Due to its proximity to the Cascadia Subduction Zone, the Subduction zone earthquakes will pose predominant risk in Tillamook County. Two scenarios were chosen in this study for HAZUS analyses:
- • An 8.5 magnitude event on the Cascadia Subduction Zone – The "M8.5 CSZ Model" - The M8.5 Cascadia Subduction Zone Model describes a typical earthquake on the Cascadia Subduction Zone Fault. The magnitude of 8.5 (moment magnitude) is an event in which about half of the length of the fault would rupture. This was modeled as having the rupture zone parallel to the coast of Oregon at a distance of 20 km.
- • Probabilistic ground shaking hazard with 500-year return period – The "500 Year Model" - The ground motion for this scenario is based on the hazard maps created by the U. S. Geological Survey for the National Seismic Hazard Mapping Project (Frankel and others, 1996). This earthquake scenario was modeled as a long duration event for the purpose of computing seismic demand.
- Ground motions from the two scenarios are comparable. Figure 5 shows that the peak ground acceleration (PGA) values are nearly the same for small coastal tracts, but for the M8.5 CSZ Model the shaking drops off more noticeably in the eastern portions of the county. The 500 Year Model shows fairly uniform shaking.

Conclusion

- We need better support from Business and Industry , Phone Book Hazard and Evacuation Maps
- To build stronger partnerships with our Universities and State and Federal agencies
- Combine resources and conduct local preparedness and planning workshops
- Keep maps simple and easy to interpret
- Conduct annual drills and exercises to test the scenarios with all first responders and the public.