



# Seattle Fault Earthquake Scenario

Presented at the  
**New Madrid  
Earthquake Scenario  
Workshop**

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**Earthquake Engineering  
Research Institute**



## Seattle Fault Earthquake Scenario

# Objective

- Intent of the scenario study:
  - Influence legislature (No Seismic Safety Commission)
  - Increase awareness of a real threat
  - Start (or continue) a conversation
  - Have some public policy debate
  - Increase our region's preparedness
- Develop recommendations and impetus for effective actions to protect:
  - Lives
  - Critical facilities
  - Key infrastructure



## Seattle Fault Earthquake Scenario

# Overview

- Project conceived in 2002 - EERI board wanted presence
- Scenario rollout in 2005 – 3 years
- Builds on previous work and current research
- Authored by multidisciplinary project team typical of EERI:
  - Seismologists
  - Geologists
  - Geotechnical Engineers
  - Civil and Structural Engineers
  - Land Use Planners \*
  - Emergency Managers
  - Economists \*
  - Social Scientists
- Run by 12 person oversight committee



# Collaborative Public-Private Effort

- American Society of Civil Engineers (ASCE) –
  - Geotechnical
  - Lifelines
- Structural Engineers Association of Washington (SEAW) –
  - Structural
  - Critical facilities
- Cities of Seattle and Bellevue
  - Emergency management
- Cascadia Earthquake Region Workgroup (CREW)
  - Business impacts
- Earthquake Engineering Research Institute (EERI)
  - Board representative
  - Editor (paid)
  - Administrative support (paid)
- United States Geological Survey (USGS)
  - Seismology/groundmotion
  - Mapping/GIS
  - Financial support – rollout meeting venue
- University of Washington (UW) –
  - HAZUS (also paid consultant)
  - transportation
- Washington State Emergency Management Division
  - Editor (paid)
  - Publishing



# Project Participants/Schedule

- 4000+ volunteer hours
- Need people that would produce
- Monthly Oversight Committee meetings
  - Technical group meetings as required
- Firm management
- Dragged on too long
  - Hayward Scenario presented at EERI Annual Conference may have been preferable because of fixed deadline
- Many people came and went – some contributed, some didn't
- Many ideas were offered – ultimately "some" made it into the document
  - Kickoff meeting at the U of Washington – 60 people attended



# Editors

- Started with EERI staff person
- Time/budget drawn out
- Ultimately Washington State Emergency Management Division stepped in to wrap up providing editing and publication
- Washington State EMD editor pulled together graphics



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# Scenario Selection and Study Area

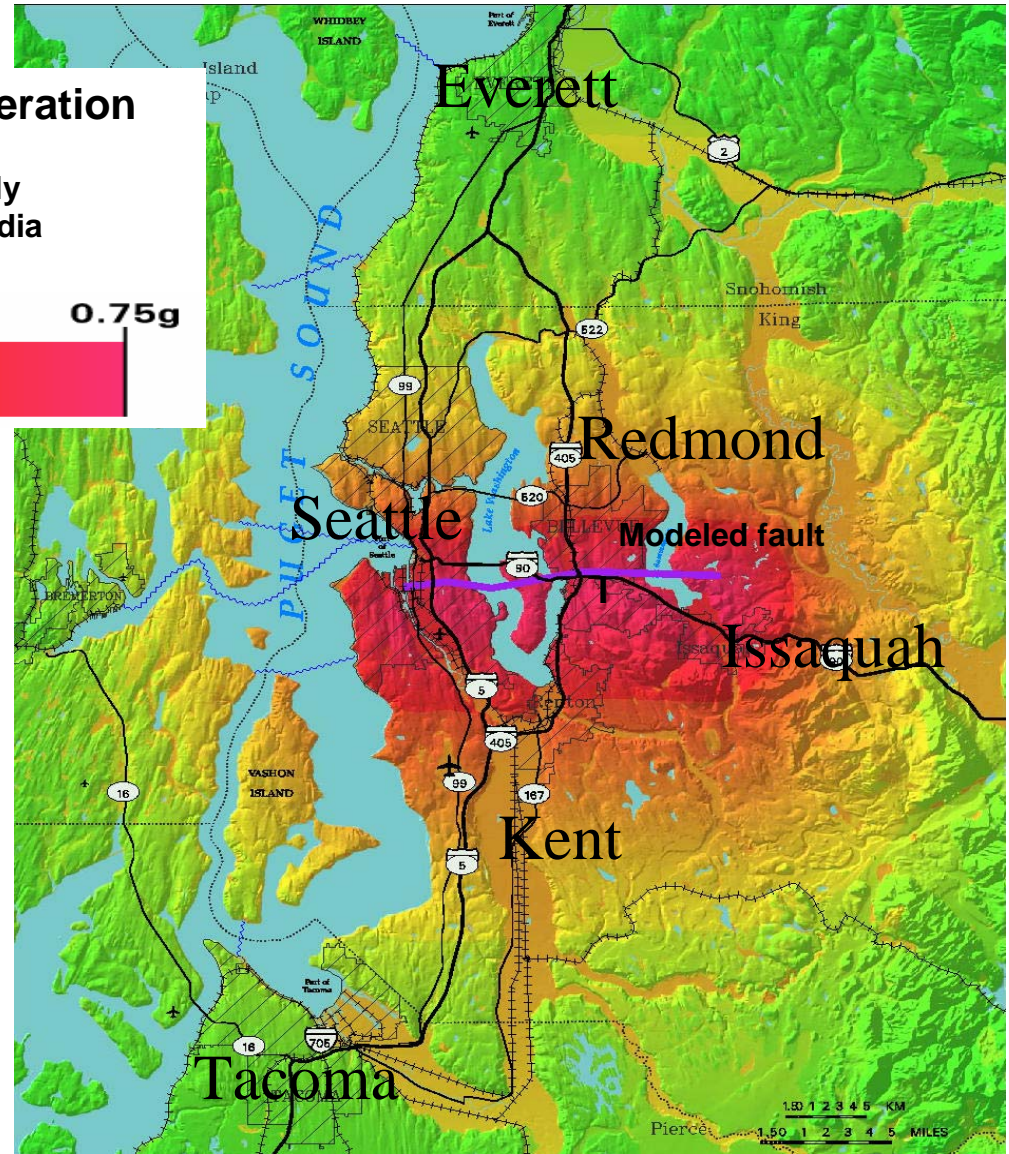
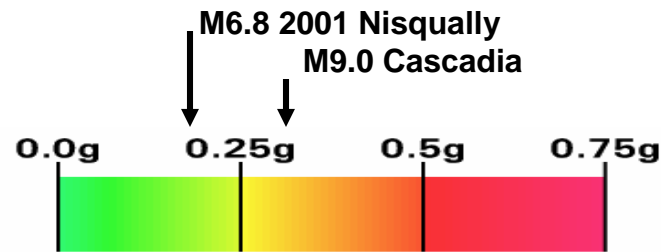
- Washington – 3 source zones
  - CREW
    - Subduction event
    - Very broad area – Vancouver BC to Cape Mendocino CA
  - EERI – Seattle Fault Scenario
  - Deep Benioff - 2001 Nisqually Earthquake
- Magnitude 6.7 – believable, geologic evidence
  - Another scenario (with very long return period) developed by others to show overtopping of sea wall
  - Tsunamis excluded (well before Sumatra event)
- Study area
  - Focused on King County/Seattle
  - Pierce and Snohomish Counties were peripheral
  - More than half state's population
    - Six of the 10 largest cities in state
  - Cornerstone of state's economy
  - For simplicity – excluded Kitsap County

# M6.7 Scenario Ground Motions



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## Peak Ground Acceleration





# Study Organization

## Phase I

- Ground motions and soil effects

## Phase II

- Lifeline and transportation systems
- Building and critical facilities

## Phase III

- Business impacts
- Recovery and response
- Recommended actions

Performed sequentially – became scheduling issue



# GIS and HAZUS

- USGS provided GIS and produced all maps
- HAZUS
  - Consultant paid to develop study area
  - Used to provide overall impacts
    - Causalities
    - Critical facilities
    - Building impacts
- Experience/previous studies used to focus on lifeline, transportation, and structural performance issues

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## Results

- Deaths – 1,600
- Dollars - \$33B
- Downtime – weeks to years



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## Special Scenario Color

- Neighborhood assessments
  - Focus on selected heavily impacted areas
  - URM's Pioneer Square – Seattle
  - Small city older construction
  - Small city modern construction
- Human impacts narrative tried to present non-technical view point



## Recovery and Response

- Seattle and Bellevue emergency management personnel
- Only significant input from local jurisdictions
- Critical in providing a comprehensive picture



## Rollout and Impact

- USGS sponsored space in conference center
- 400 attendees representing broad cross section of regional officials and technical personnel
- Great resource for garnering support for earthquake funding
- No clear impact on legislature
- Several changes in WSDOT bridge upgrade policies



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# QUESTIONS ?