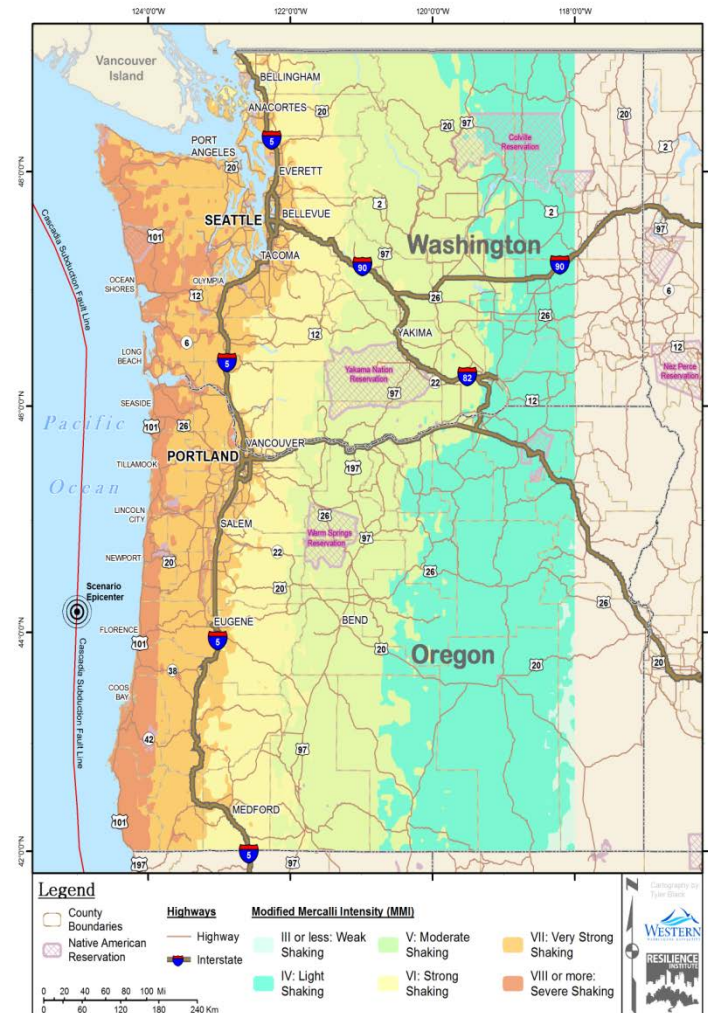


# Cascadia Subduction Zone (CSZ) Earthquake and Tsunami

## Damage Impacts Overview

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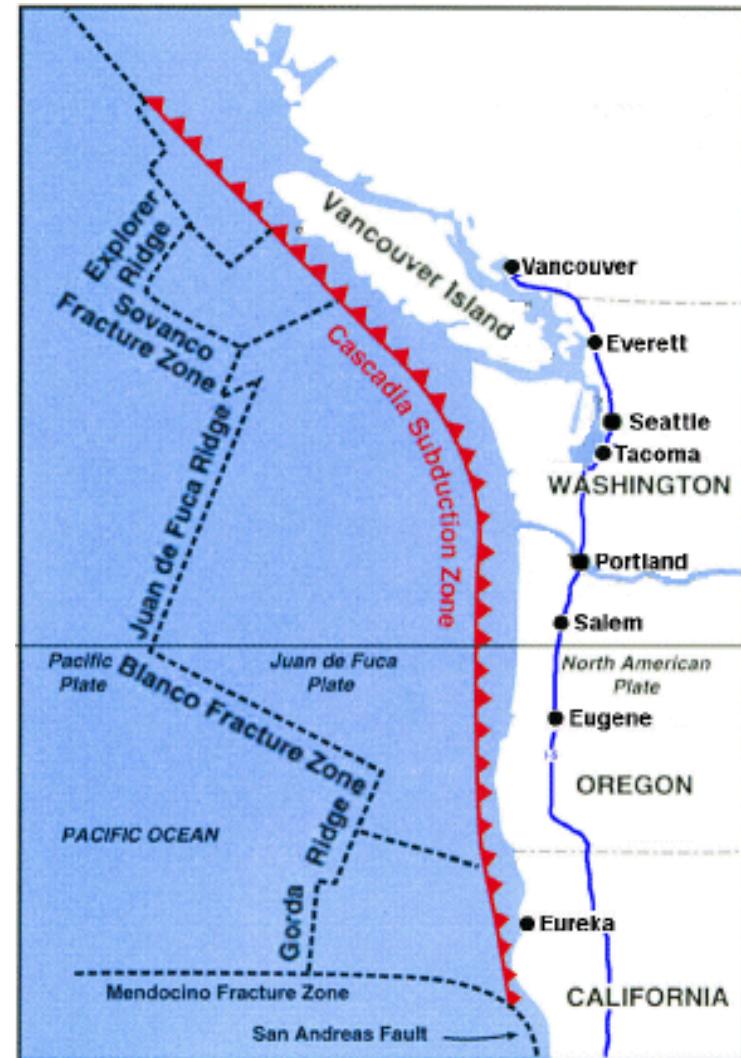
Patrick J. Massey  
Director, National Preparedness Division  
FEMA Region 10



# Plan Scenario

## CSZ Earthquake and Tsunami – FEMA/Federal interagency response plan:

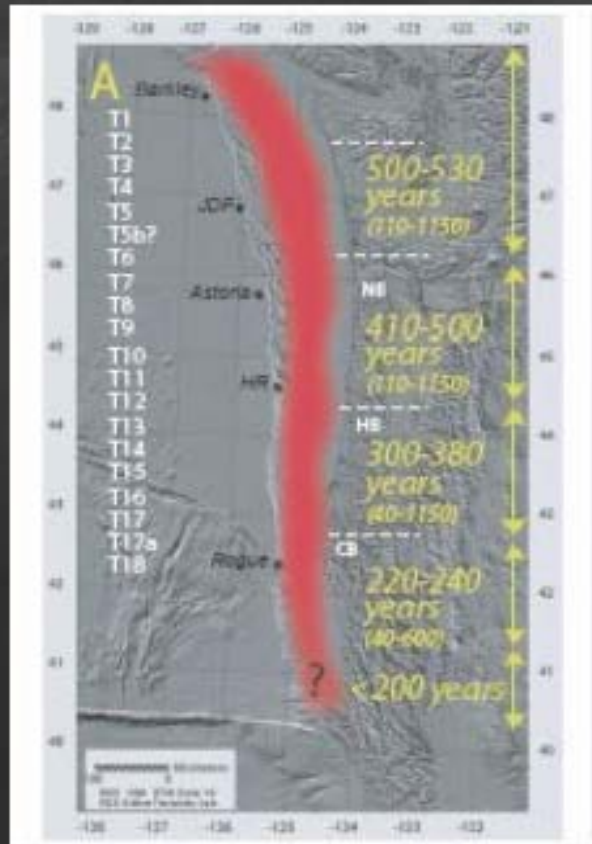
- 9.0 Magnitude earthquake occurs in February
- Direct Impact to 3 States and BC
- Complete rupture of the 800-mile Fault Line
- Impacts affecting over 140,000 square miles
- Ground shaking lasts up to 5 minutes
- Numerous aftershocks with several of M7.0+
- Modelled estimates: 1,100 fatalities from earthquake; 13,000 fatalities from tsunami; 24,000 injured.



## CSZ modeled Critical Facility Impacts to WA and OR (I-5 Corridor to Coast)

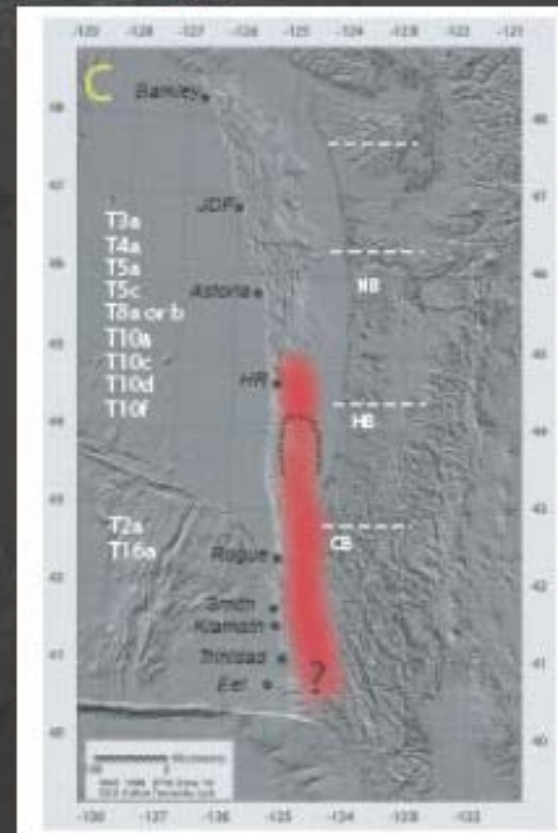
| Type of Facility          | No. of Critical Facilities with Moderate to Complete Damage | Total Number of Facilities | Percent of Critical Facilities with Moderate to Complete Damage |
|---------------------------|-------------------------------------------------------------|----------------------------|-----------------------------------------------------------------|
| Potable Water Facilities  | 92                                                          | 104                        | 88%                                                             |
| Ports Facilities          | 632                                                         | 716                        | 88%                                                             |
| Rail Facilities           | 97                                                          | 116                        | 84%                                                             |
| Waste Water               | 249                                                         | 323                        | 77%                                                             |
| Fire Stations             | 1,333                                                       | 2,051                      | 75%                                                             |
| Natural Gas Facilities    | 106                                                         | 147                        | 72%                                                             |
| Airports                  | 65                                                          | 98                         | 66%                                                             |
| Communications            | 682                                                         | 1032                       | 66%                                                             |
| Electric Power Facilities | 743                                                         | 1281                       | 58%                                                             |
| Hospitals                 | 189                                                         | 357                        | 53%                                                             |
| Police                    | 204                                                         | 420                        | 49%                                                             |
| EOCs                      | 46                                                          | 102                        | 45%                                                             |
| Hwy Bridges               | 1,952                                                       | 7,702                      | 25%                                                             |

# Last 10,000 years of big earthquakes from offshore geology



20 ~M9 events,

20 ~M8 to M8.5 events



(Goldfinger et al., 2008, Bull. Seis. Soc. Amer)

# Exercise Scenario Document – CI Impacts

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## Methodology

### Cascadia Subduction

### Zone Overview

### Tsunami Impacts

### Population Impacts

- Injuries
- Fatalities

### Transportation

- Roads
- Bridges
- Rail  
Transportation
- Air  
Transportation
- Seaports

### Water Resource Infrastructure

## Energy

- Electric Power
- Natural Gas
- Refined Fuel

## Critical Public Safety Facilities

- EOCs/ECC
- Fire Station
- Police Stations
- Hospitals
- Schools

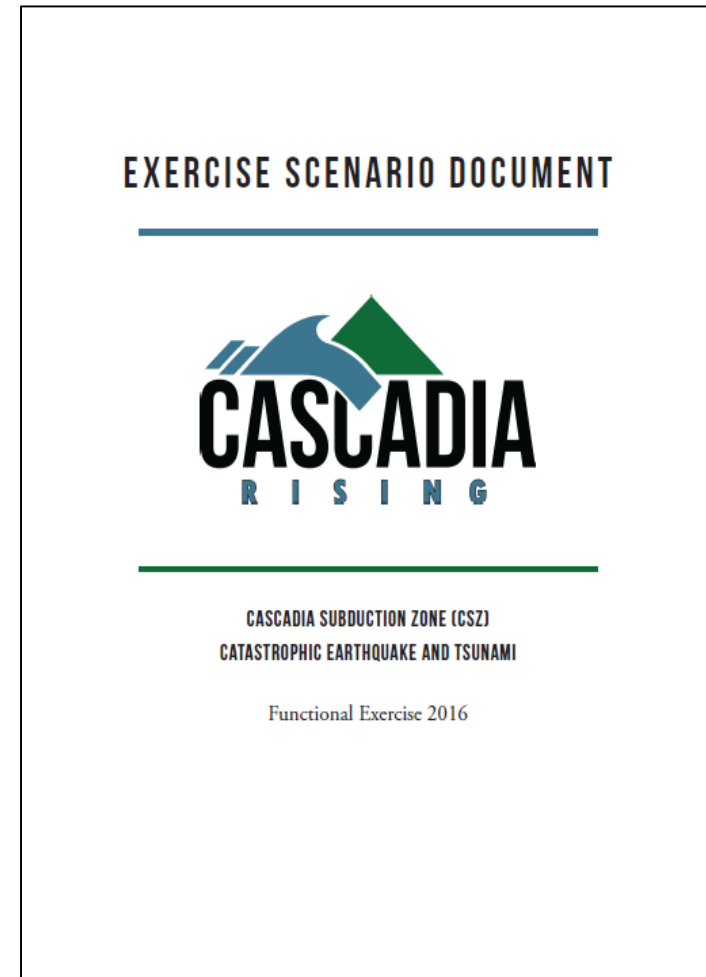
## Hazardous Materials

## Water and Wastewater Facilities

## Communication Systems

## Buildings

## Shelters



Functional Exercise Date:  
June 7-10, 2016

# Example: Bridge Impacts

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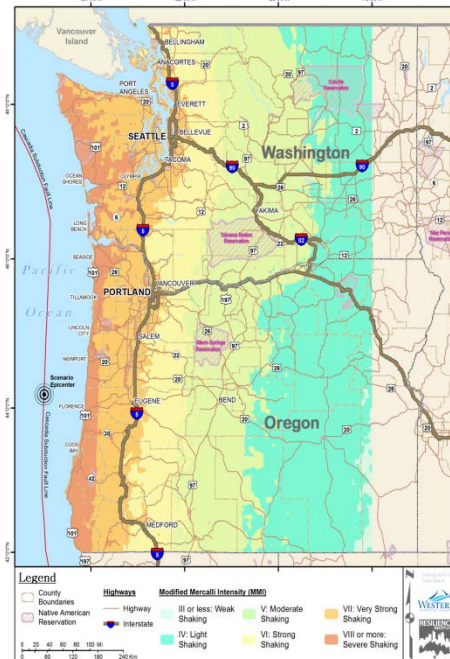
| Area of Operation                    | None       | Low                                                                                                                           | Medium                                                                                                                                                                                                     | High                                                                                                                                              |
|--------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Coastal                              | 10%        | 11%                                                                                                                           | 24%                                                                                                                                                                                                        | 55%                                                                                                                                               |
| I-5 corridor                         | 32%        | 6%                                                                                                                            | 42%                                                                                                                                                                                                        | 20%                                                                                                                                               |
| East                                 | 94%        | 6%                                                                                                                            | 0%                                                                                                                                                                                                         | 0%                                                                                                                                                |
| <b>Summary of damage description</b> | No damage. | Slight damage requiring only minor, cosmetic repairs, but the bridges can support traffic even before these repairs are made. | Moderate damage requiring repairs before use, but not requiring demolition of bridges. Bridges may not support heavy loads and will likely require engineering assessments before deemed safe for traffic. | Bridge collapse or damages so severe as to require demolition and complete replacement of the entire bridge. Bridge likely impassable to traffic. |

# Exercise Scenario Document

## EXERCISE SCENARIO DOCUMENT



CASCADIA SUBDUCTION ZONE  
CATASTROPHIC EARTHQUAKE AND  
Functional Exercise 20



High Resolution

[https://huxley.wvu.edu/sites/huxley.wvu.edu/files/Cascadia\\_Rising\\_high\\_0.pdf](https://huxley.wvu.edu/sites/huxley.wvu.edu/files/Cascadia_Rising_high_0.pdf)

Low Resolution

[https://huxley.wvu.edu/sites/huxley.wvu.edu/files/media/Cascadia\\_Rising\\_low.pdf](https://huxley.wvu.edu/sites/huxley.wvu.edu/files/media/Cascadia_Rising_low.pdf)