

M9.0 Cascadia Earthquake Impacts to Transportation and Economy



The Oregon Resilience Plan Overview



Impacts to State's Transportation Infrastructure from a M9.0 Cascadia Earthquake



Impact to Oregon's Economy from a M9.0 Cascadia Earthquake



Minimizing impacts to Oregon Economy through Strategic Investments in Highway Resilience

An aerial photograph of the state of Oregon, showing its geographical features including the coastline on the left, the Willamette Valley in the center, and the Cascade Range to the east. The text is overlaid on this map.

The Oregon Resilience Plan

An Overview

**Presentation to House Committee on Transportation
and Economic Development**

Kent Yu, OSSPAC Chair

May 15, 2013

The Oregon Resilience Plan

The Oregon Resilience Plan

Reducing Risk and Improving Recovery
for the Next Cascadia Earthquake and Tsunami

Report to the
77th Legislative Assembly

from
Oregon Seismic Safety Policy
Advisory Commission (OSSPAC)



Salem, Oregon
February 2013

50-year Comprehensive Plan

☐ Save Lives

☐ Protect our Economy

☐ Preserve our Communities

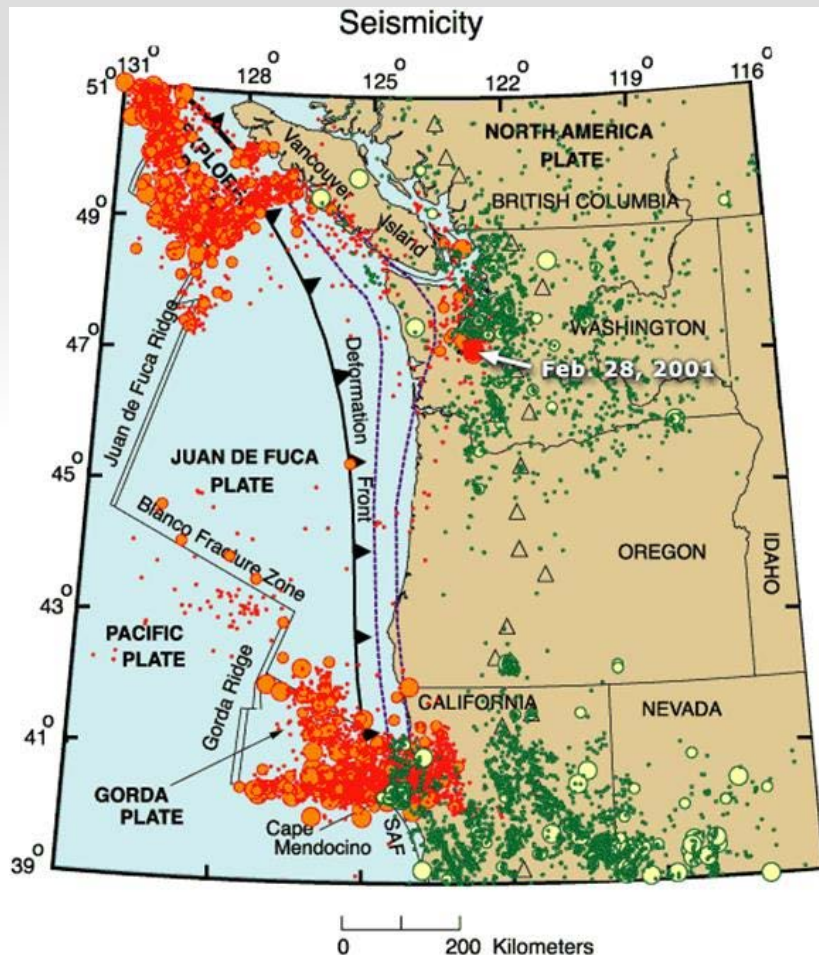
☐ 169 Expert Volunteers

☐ \$0 Funding

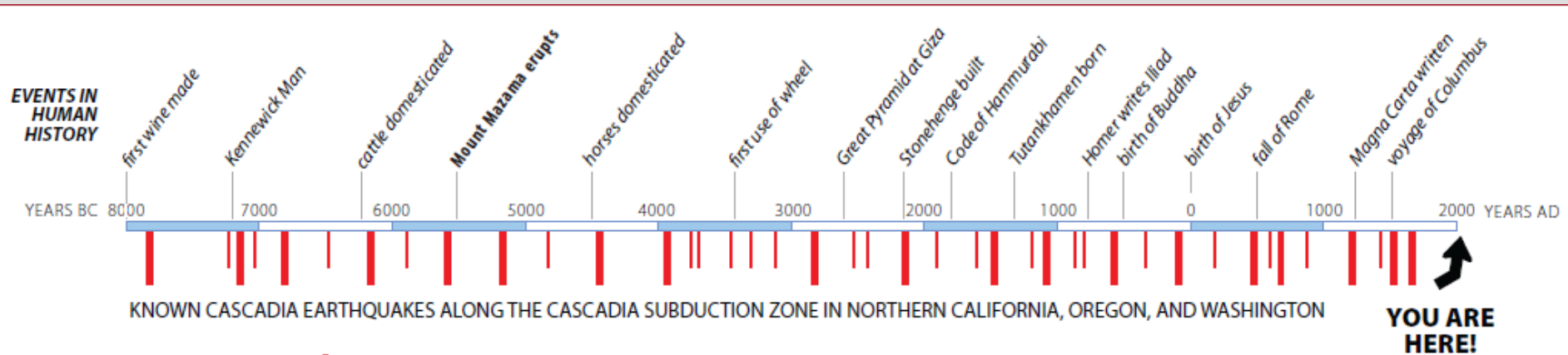
☐ One-year Schedule

Cascadia Subduction Earthquake

- Strong Ground Shaking (M9 w/ 2 - 4 min shaking)
- Tsunami within 15 to 25 minutes

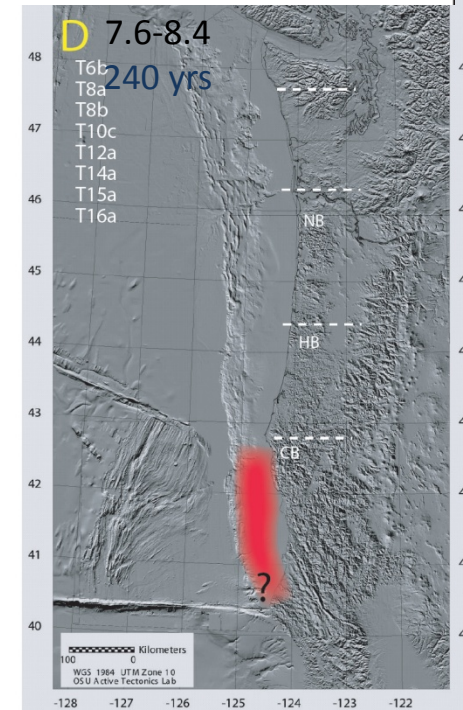
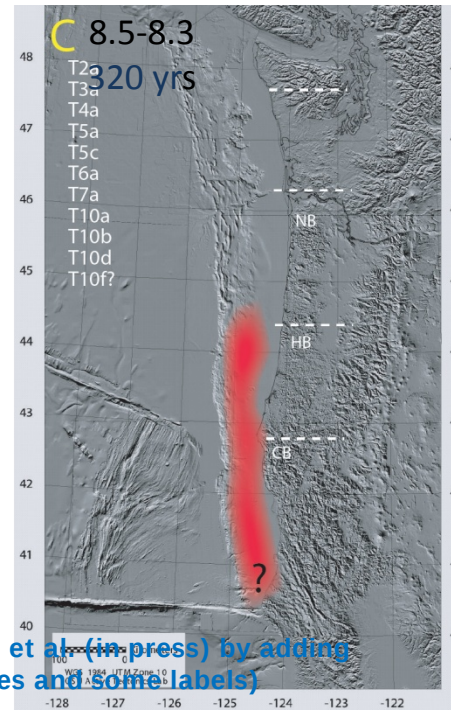
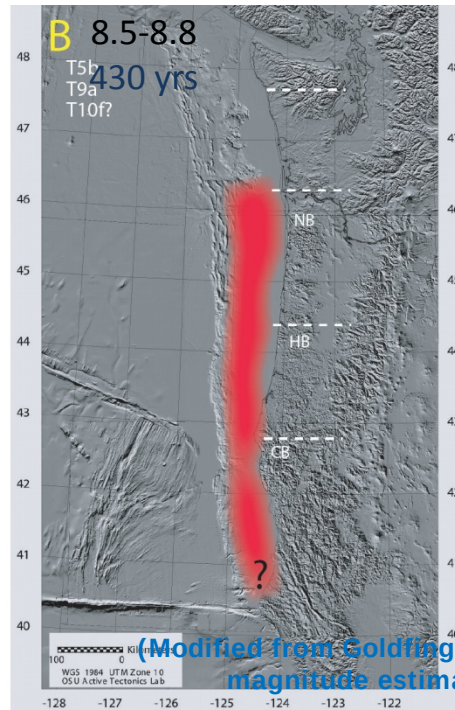
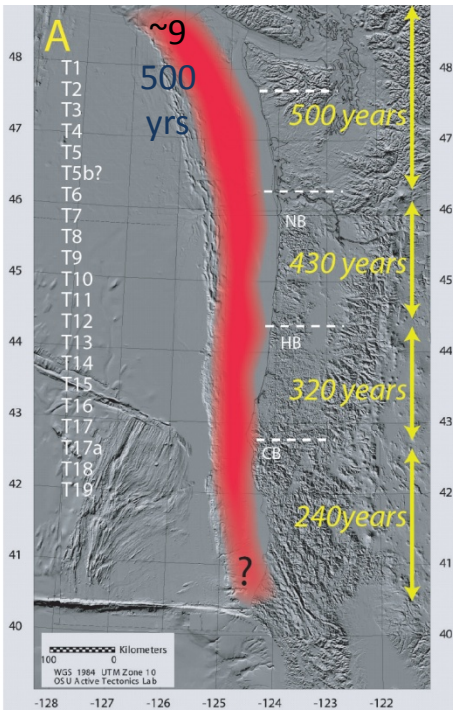


Cascadia Subduction Zone Earthquakes



Earthquake of Magnitude 9+ (fault breaks along entire subduction zone)

Earthquake of Magnitude 8+ (fault breaks along southern half of subduction zone)



(Modified from Goldfinger et al. (in press) by adding magnitude estimates and some labels)

House Resolution 3

76th OREGON LEGISLATIVE ASSEMBLY--2011 Regular Session

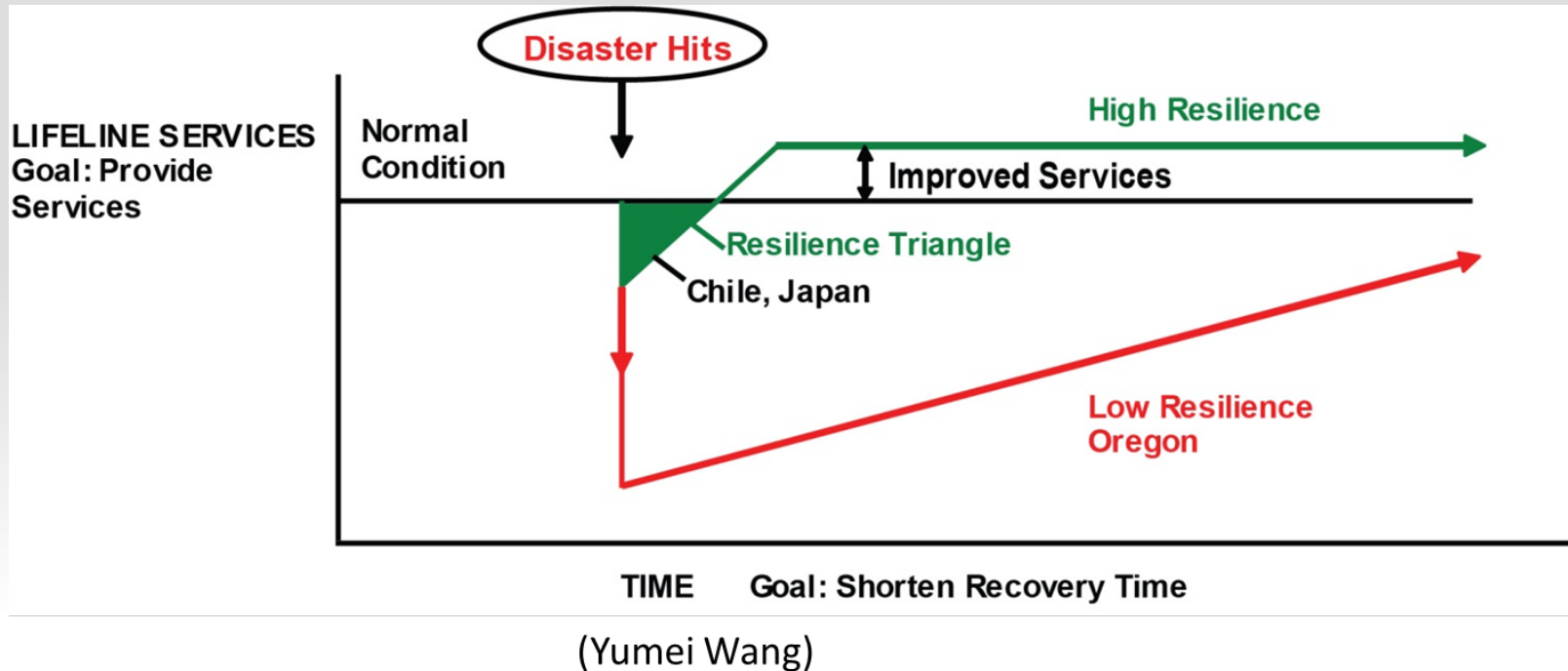
Enrolled

House Resolution 3

Sponsored by Representative BOONE; Representatives COWAN, KRIEGER, ROBLAN, WITT, Senators COURTNEY, JOHNSON, KRUSE, VERGER, WHITSETT

- Directs Oregon Seismic Safety Policy Advisory Commission (OSSPAC) to “lead and coordinate preparation of an Oregon Resilience Plan that . . . makes recommendations on policy direction to protect lives and keep commerce flowing during and after a Cascadia (megathrust) earthquake and tsunami.”
- Focuses on physical infrastructure

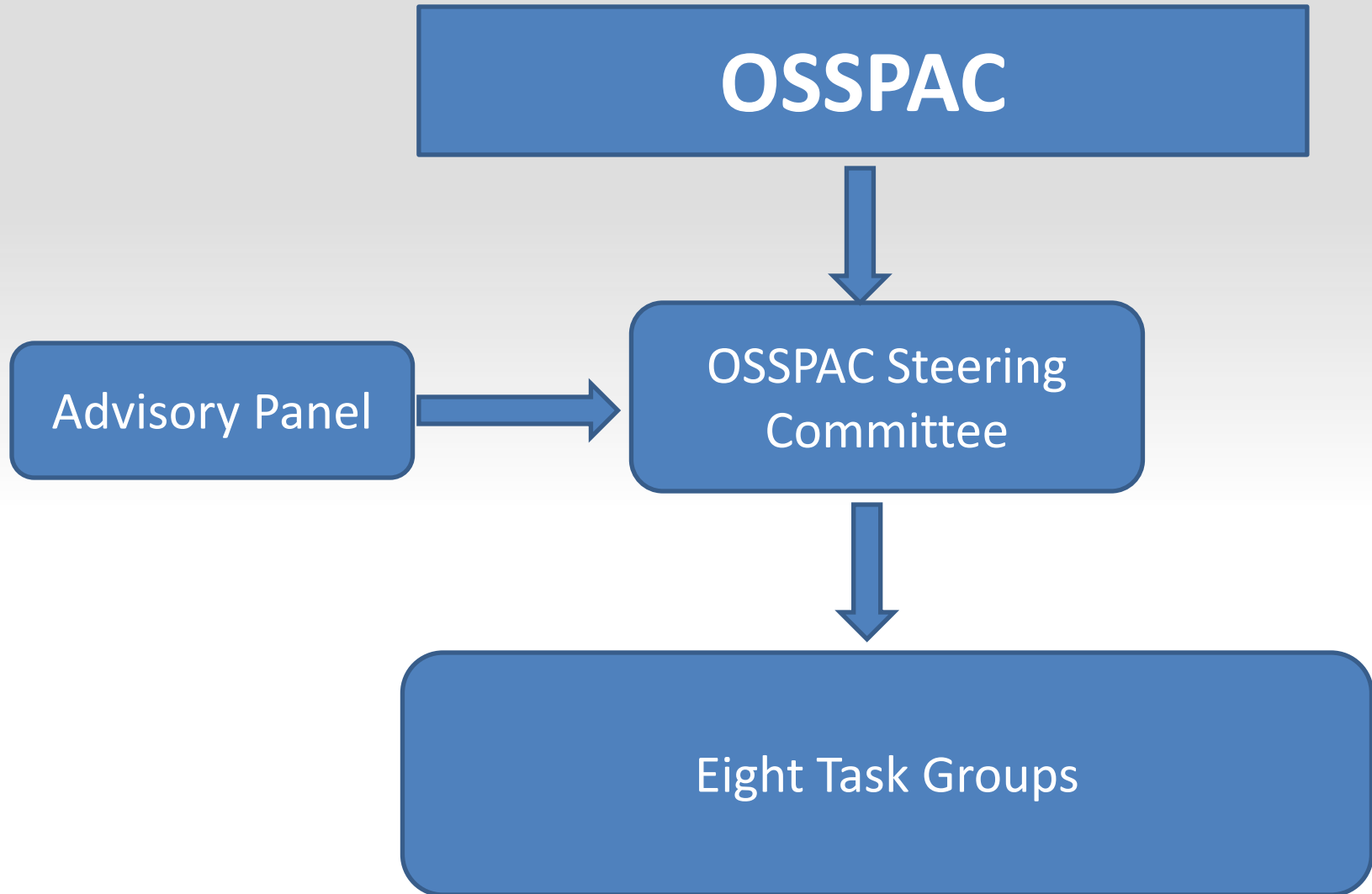
Definition of Resilience



- **Resilience:** Save lives, Reduce Losses, Speed Recovery, & Rebuild Better

- Sustainability without **Resilience** is NOT sustainable!

Organizational Structure



Eight Task Groups

Business and Work Force
Continuity

Coastal Communities



- Critical/Essential Buildings
- Energy
- Information and Communications
- Transportation
- Water and Waste Water



Magnitude 9.0
Earthquake/Tsunami Scenario

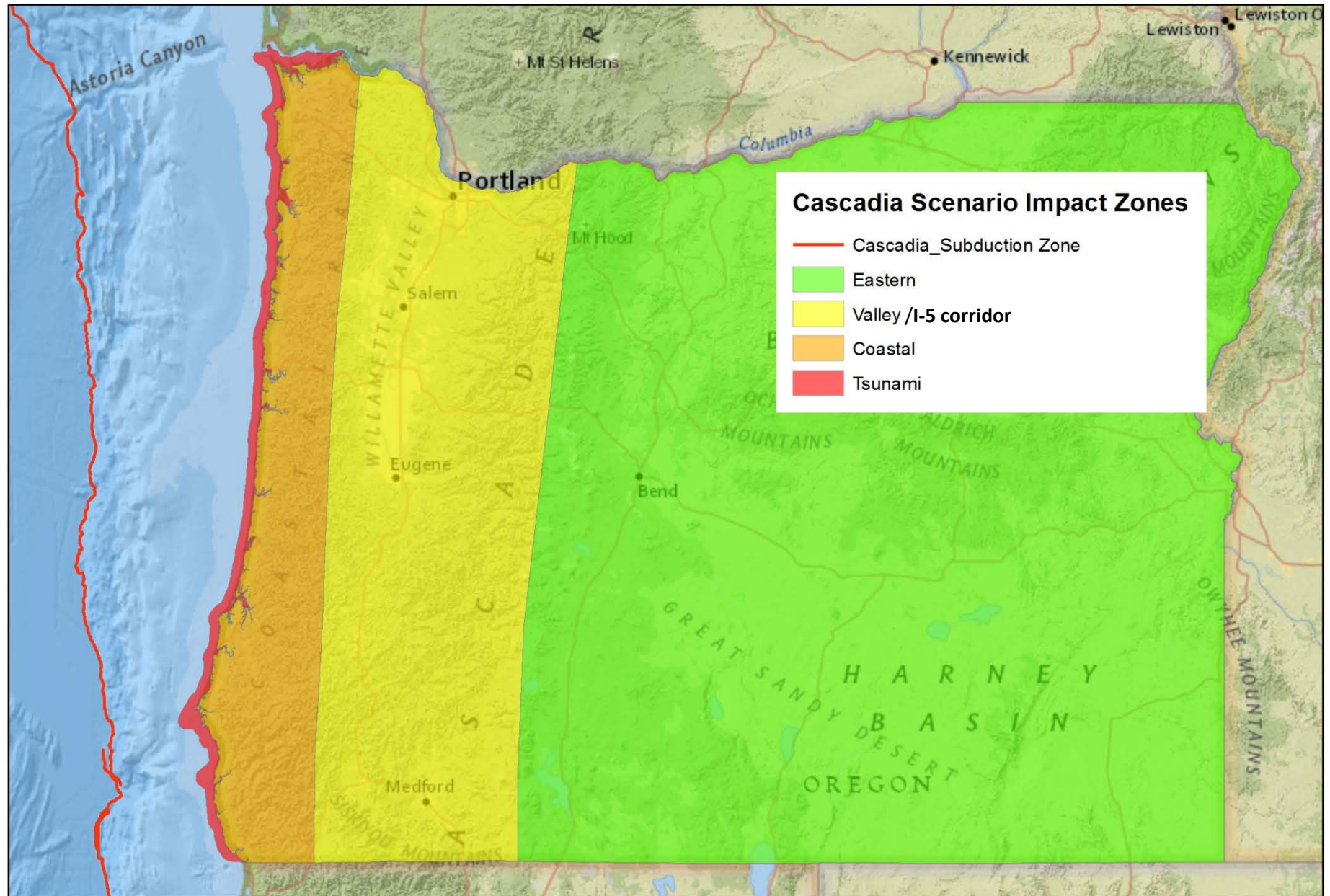
Team Building - Advisory Panel

- ☐ Prof. Scott Ashford (Oregon State Univ.)
- ☐ Sen. Lee Beyer (Legislature)
- ☐ Sen. Peter Courtney (Legislature)
- ☐ Ed Dennis (formerly Dept. of Education)
- ☐ JR Gonzalez (formerly Oregon PUC)
- ☐ Prof. Chris Goldfinger (Oregon State Univ.)
- ☐ Dave Harlan (Business Oregon/Ports)
- ☐ Onno Husing (formerly OCZMA)
- ☐ Bruce Johnson (ODOT)
- ☐ Dr. Leon Kempner, Jr. (BPA)
- ☐ Prof. Andre LeDuc (Univ. of Oregon)
- ☐ Dr. Vicki McConnell (DOGAMI/WSSPC)
- ☐ Jean O'Connor (Oregon Health Authority)
- ☐ Cameron Smith (Governor's office)
- ☐ Jeff Soulages (Intel)
- ☐ Yumei Wang (DOGAMI/NEHRP)
- ☐ Edward Wolf (Oregon citizen)
- ☐ Dr. Nate Wood (USGS)

Team Building - Eight Task Groups

- Earthquake and Tsunami Scenario: **Ian Madin** (DOGAMI, OSSPAC)
- Business/Work Force Continuity: **Susan Steward** (BOMA, OSSPAC) & **Gerry Williams** (OSSPAC)
- Coastal Communities: **Jay Wilson** (vice Chair, OSSPAC) & **Jay Raskin** (OSSPAC)
- Critical/Essential Buildings: **Ed Quesenberry** (SEAO) & **Trent Nagele** (SEAO)
- Transportation: **Bruce Johnson** (ODOT)
- Energy: **JR Gonzalez** (formerly OPUC) & **Stan Watters** (Port of Portland, OSSPAC)
- Information and Communications: **Mike Mumaw** (OSSPAC)
- Water and Wastewater: **Mike Stuhr** (City of Portland PWB) & **Mark Knudson** (TVWD)

Four Zones

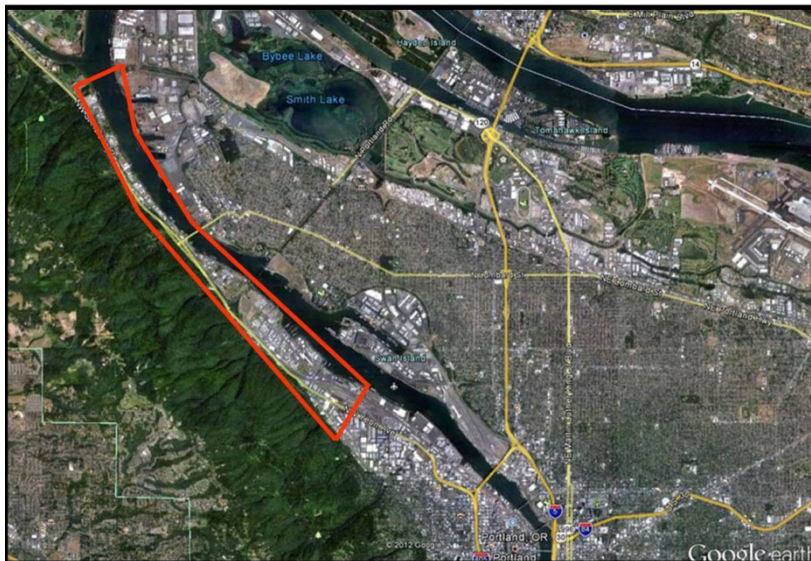


Oregon Resilience Planning Steps

- Assess **performance** of existing critical facilities and lifeline systems, and estimate timeframes required to restore functions at present conditions;
- Develop resilience goals based on business and community needs for each zone;
- Define acceptable target timeframes to restore functions to meet resilience goals; and
- Prepare **recommendations** for statewide policies and actions to achieve the desired performance targets.

Key Findings

- Oregon is far from resilient to the impact of a great Cascadia earthquake today
 - Casualties (a few thousand to more than 10,000)
 - Economic Loss (close to 20% state GDP)
 - More than one million truck loads of debris
- Liquid Fuel vulnerability



Current Resilience Gap

- Business can only tolerate two to four weeks of disruption of essential services

Critical Service	Zone	Estimated Time to Restore Service
Electricity	Valley	1 to 3 months
Electricity	Coast	3 to 6 months
Police and fire stations	Valley	2 to 4 months
Drinking water and sewer	Valley	1 month to 1 year
Drinking water and sewer	Coast	1 to 3 years
Top-priority highways (partial restoration)	Valley	6 to 12 months
Healthcare facilities	Valley	18 months
Healthcare facilities	Coast	3 years

Overarching Recommendations

- Establish a State Resilience Office to provide leadership, resources, advocacy, and expertise in implementing statewide resilience plans
- Undertake comprehensive seismic assessments of the key structures and systems that underpin Oregon's economy;



Overarching Recommendations

- Launch a sustained program of capital improvement in Oregon's public structures;
- Craft a package of incentives to engage Oregon's private sector to advance seismic resilience;
- Update Oregon's public policies

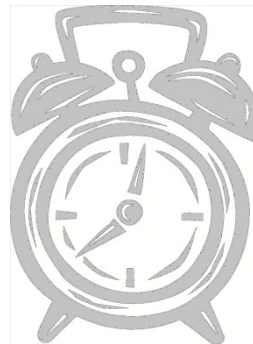
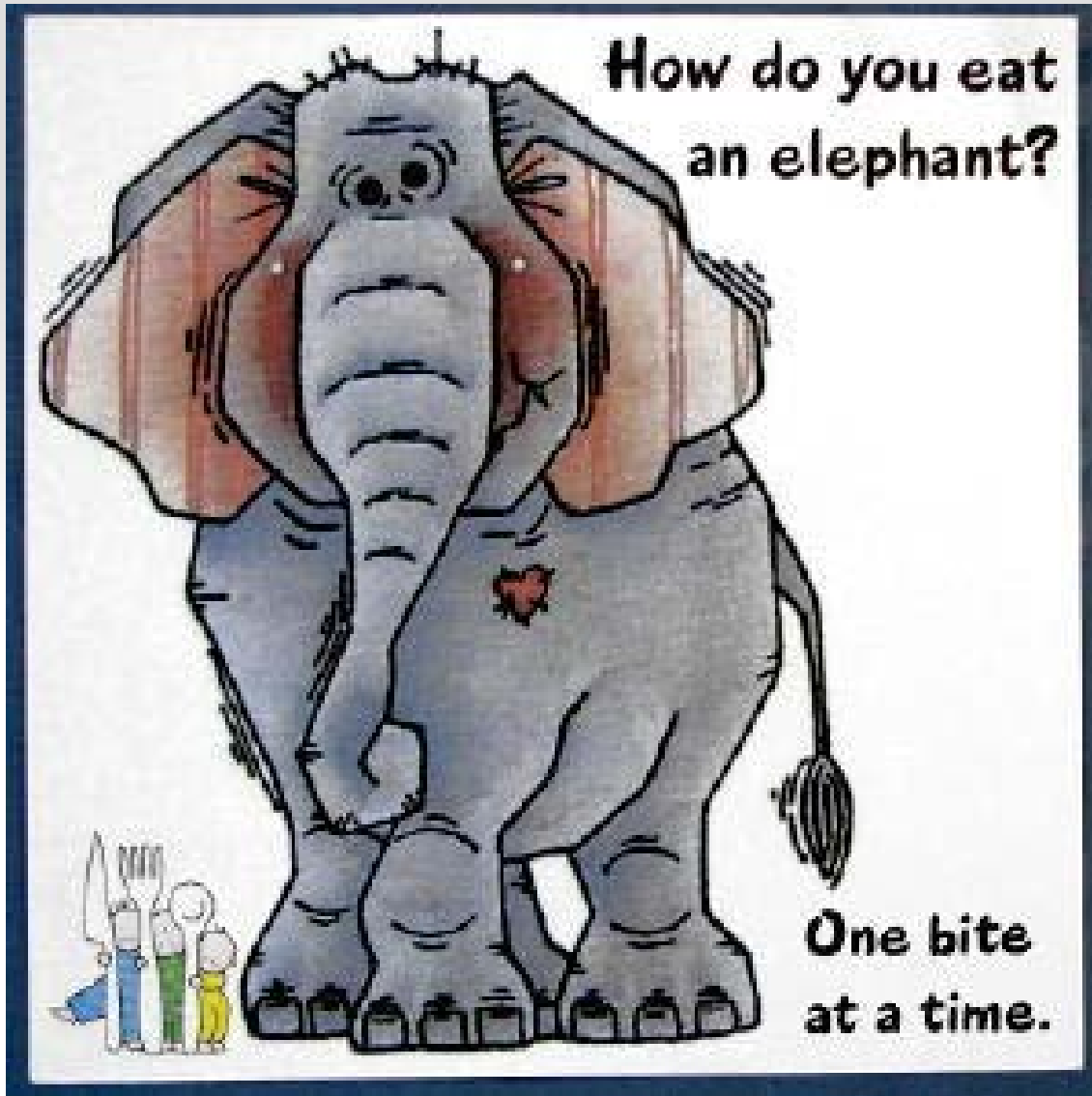


Looking Ahead

- Propose to work with Oregon's Legislative Assembly to keep the 50-year goal in view
- Community-level Planning
- Joint regional planning with Washington State
- Human Resilience
- Civic infrastructure



Implementation?



A Few Links for Further Reading

1. ASCE Civil Engineering Magazine coverage:
<http://www.constructioninst.org/CEMagazine/ArticleNs.aspx?id=23622324492>
2. *Oregon Resilience Plan* executive summary (PDF):
[http://www.oregon.gov/OMD/OEM/ospac/docs/Oregon Resilience Plan Executive Summary Final.pdf](http://www.oregon.gov/OMD/OEM/ospac/docs/Oregon%20Resilience%20Plan%20Executive%20Summary%20Final.pdf)
3. *Oregon Resilience Plan* full report, by chapter:
[http://www.oregon.gov/omd/oem/pages/ospac/ospac.aspx#Oregon Resilience Plan](http://www.oregon.gov/omd/oem/pages/ospac/ospac.aspx#Oregon%20Resilience%20Plan)
4. Coverage in *The Oregonian* (Feb. 4, 2013):
[http://www.oregonlive.com/business/index.ssf/2013/02/cascadia earthquake and tsunam.html#incart m-rpt-2](http://www.oregonlive.com/business/index.ssf/2013/02/cascadia_earthquake_and_tsunam.html#incart_m-rpt-2)
5. Coverage in *The Seattle Times* (March 9, 2013):
http://seattletimes.com/html/localnews/2020525702_earthquakerecoveryxml.html
6. Materials submitted for 3/14 hearing:
<https://olis.leg.state.or.us/liz/2013R1/Committees/SVEP/2013-03-14-13-00/MeetingMaterials>
7. Coverage in *MSN/NBC News* (March 18, 2013):
<http://science.nbcnews.com/news/2013/03/18/17358702-10000-could-die-in-northwest-quake-chilling-report-says?lite&lite=obnetwork>
8. Oregon Seismic Safety Policy Advisory Commission:
<http://www.oregon.gov/omd/oem/pages/ospac/ospac.aspx>