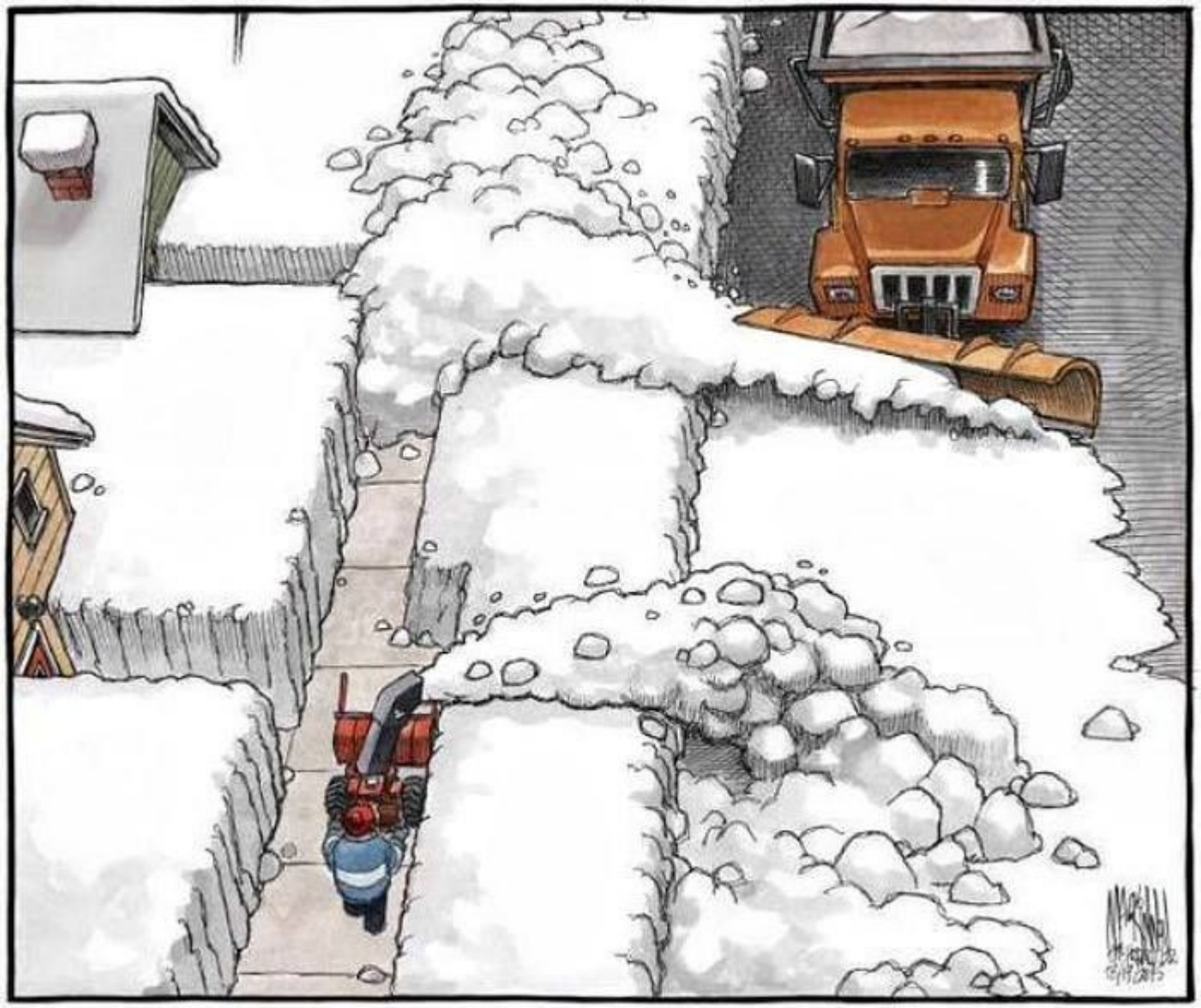
Transportation Resilience and CR22 Lessons Learned

Keynote Session 2023 Pacific Northwest Snowfighters Conference
June 6, 2023

Major General Bret D. Daugherty
The Adjutant General
Washington Military Department

Thank You, SNOWFIGHTERS!



Have you ordered your salt and sand yet?

Thank You,
QUAKE-FIGHTERS!

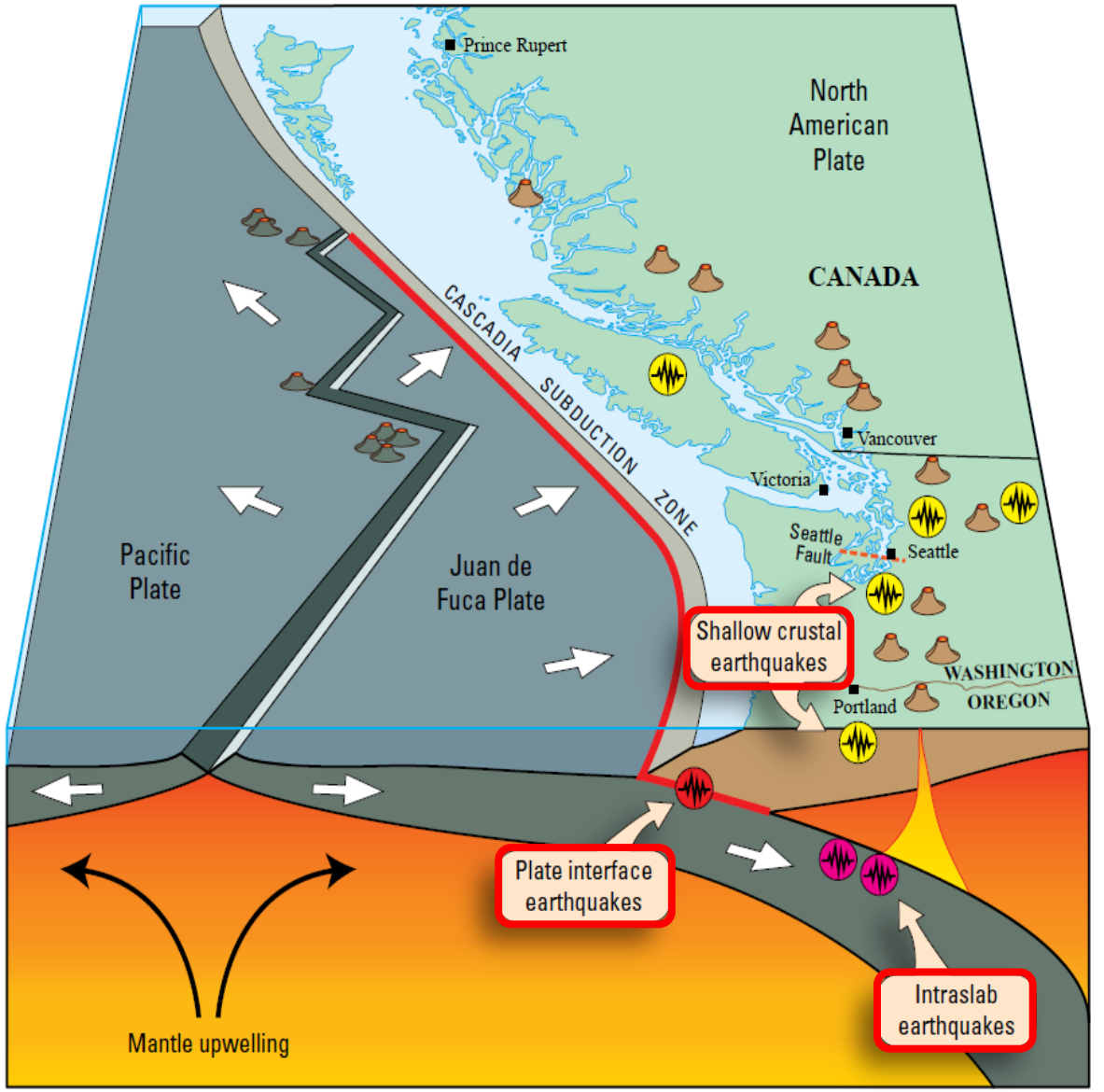
Have you hardened our lifelines yet?

Natural Hazards in Washington

- **WA has 2nd Highest EQ risk in the US**
- Tsunamis - local and distant
- 5 active volcanoes
- Landslides
- Floods
- Wildfire
- Tornados
- Winter Storms

M7 recurrence 30-50 years

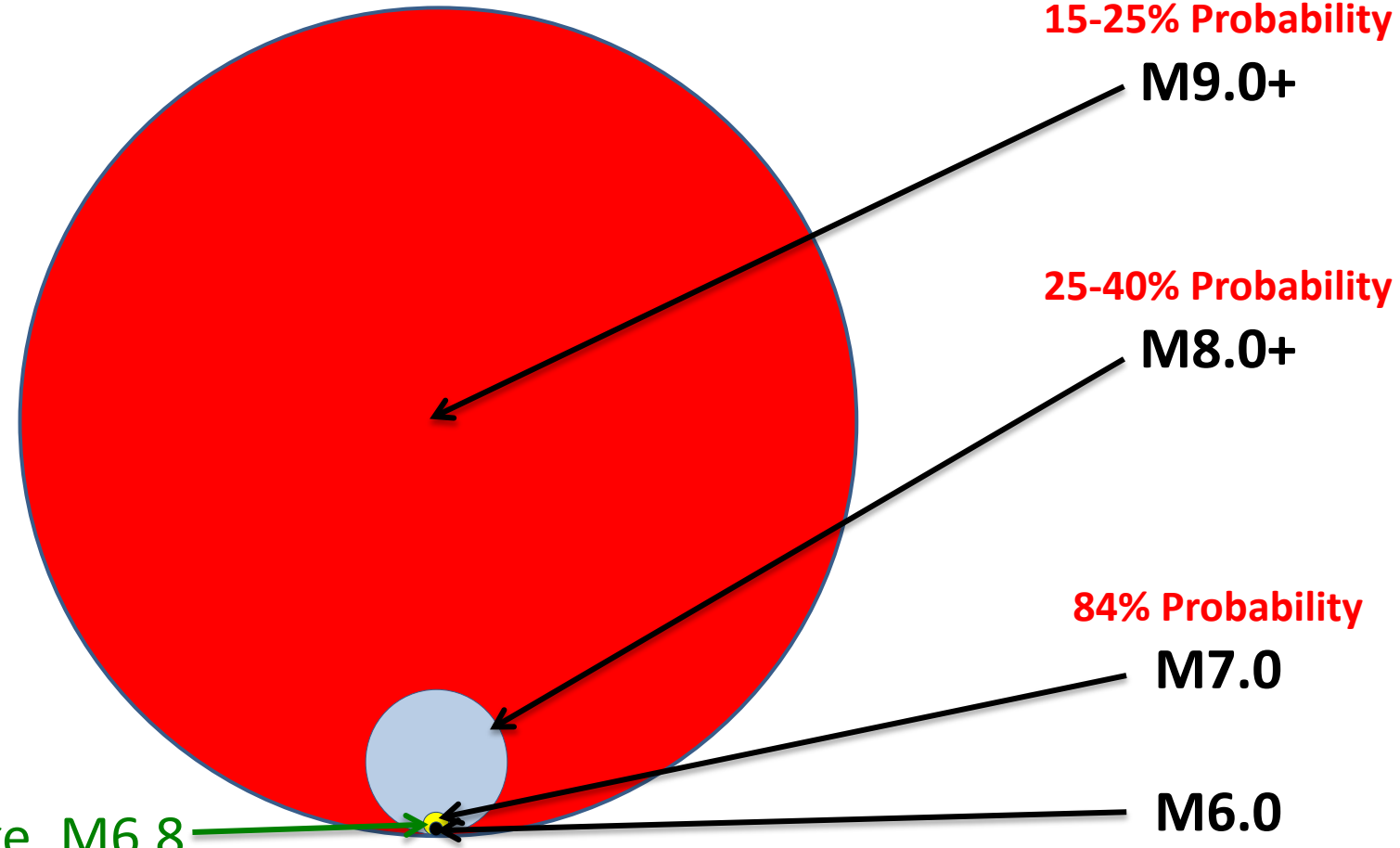
M9 recurrence 300-600 years



Washington's Probability of an Earthquake in the Next 50 Years – *Get Prepared Now*

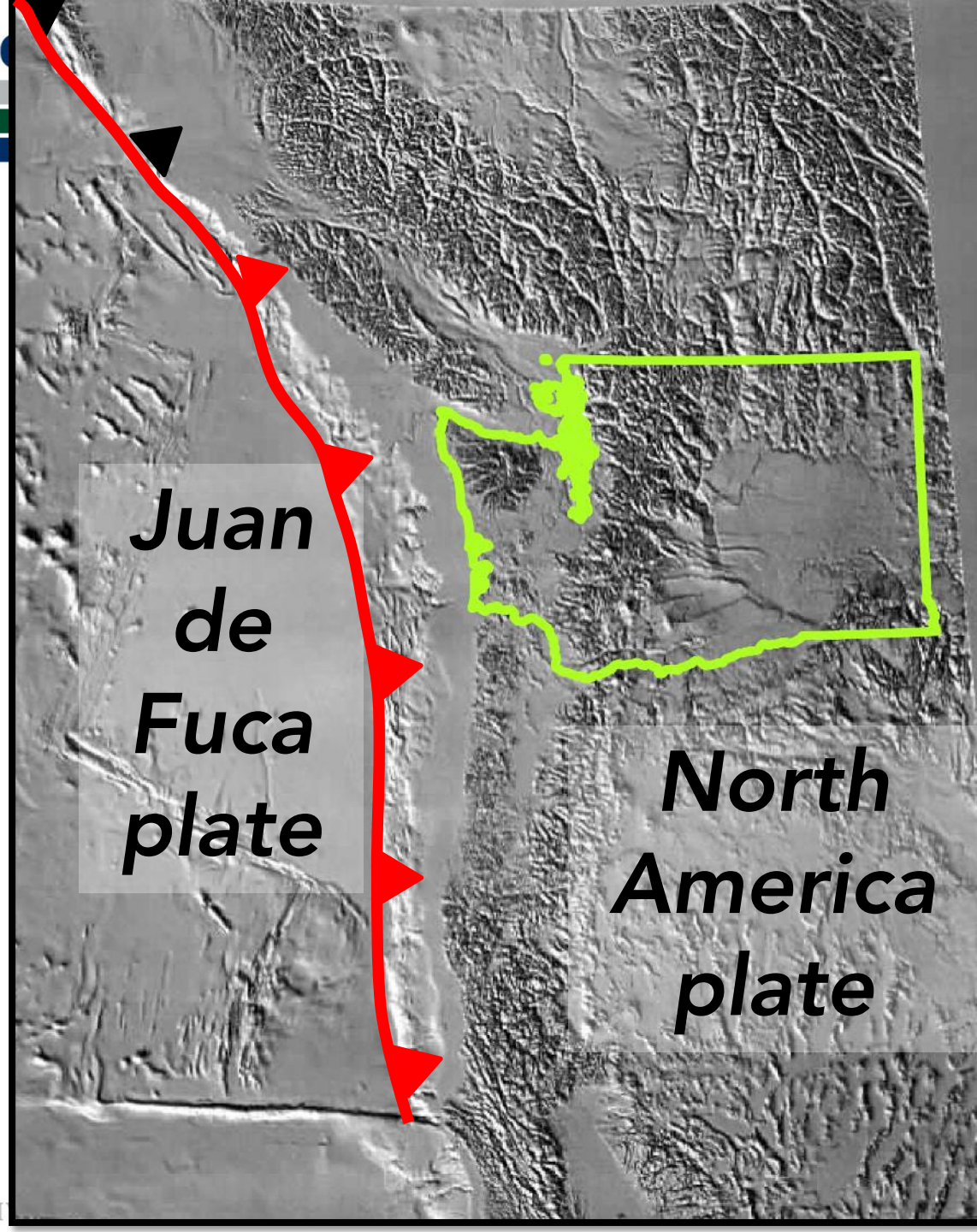
An increase of 1 in magnitude results in 32x more energy released by an earthquake. Thus, an M7.0 releases 32x more energy than a M6.0, and an M8.0 releases 1024x the energy of an M6.0!

Area of circles to the right represent relative energy release for M 6, 7, 8, and 9 earthquakes



Cascadia Subduction Zone

- 700 miles long (1,130 km)
- Breaks 300 – 600 years
- Last great rupture in 1700 (320+ years ago)
- 15-25% chance within next 50 years
- Magnitude 8.0-9.0+
- Shaking felt for 3–6 minutes
- Earthquake followed by a major tsunami hitting WA's inner coast in 60-120 min
- Many large aftershocks will follow main quake and thousands of aftershocks for many years

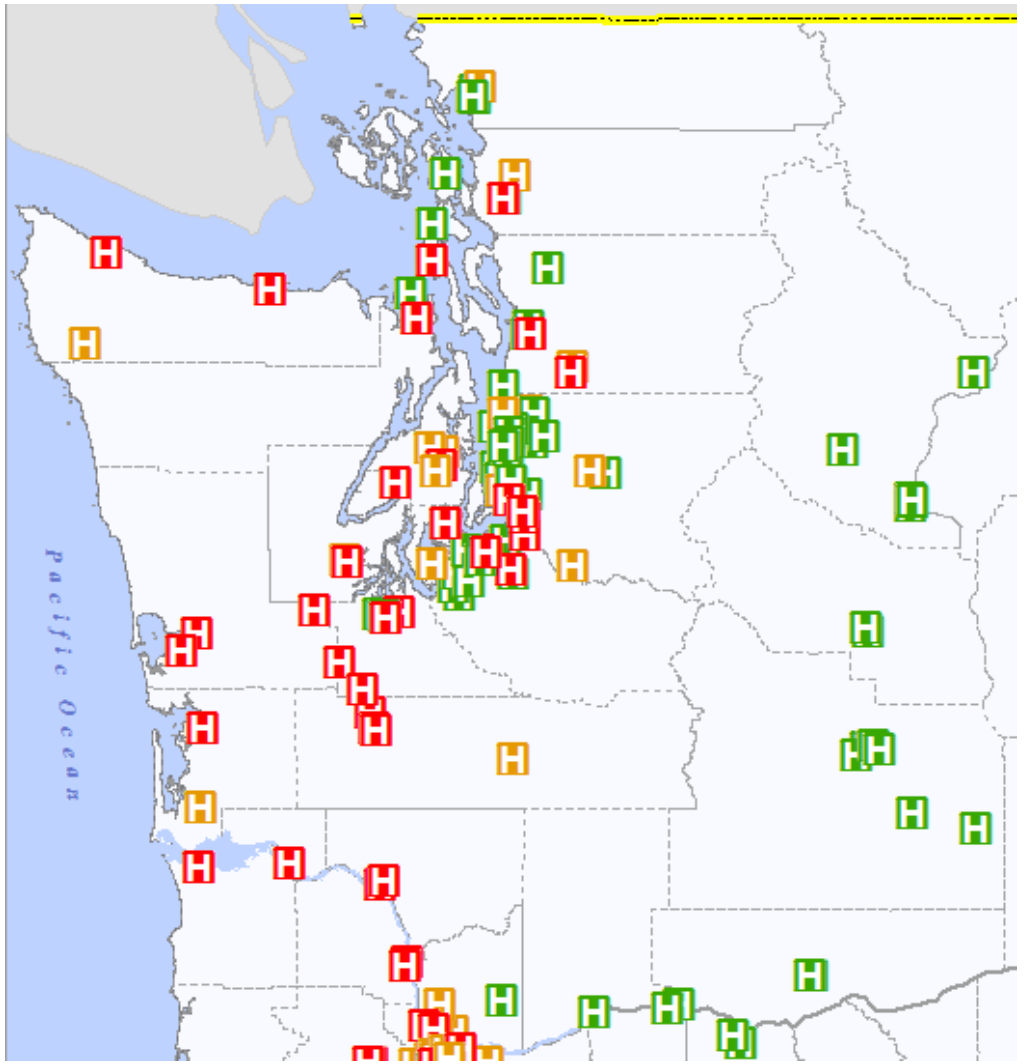


1st Order Effects – Ground Shaking

1st Order Effects – Soil Liquefaction

1st Order Effects - Tsunami

Cascadia Impacts



- Complete = Totally Destroyed.
- Severe = Severely Damaged – Not Useable
- Moderate = Moderately Damaged – 50% Capacity
- Slight = Slightly Damaged – Useable
- None = Not Damaged

Hospitals

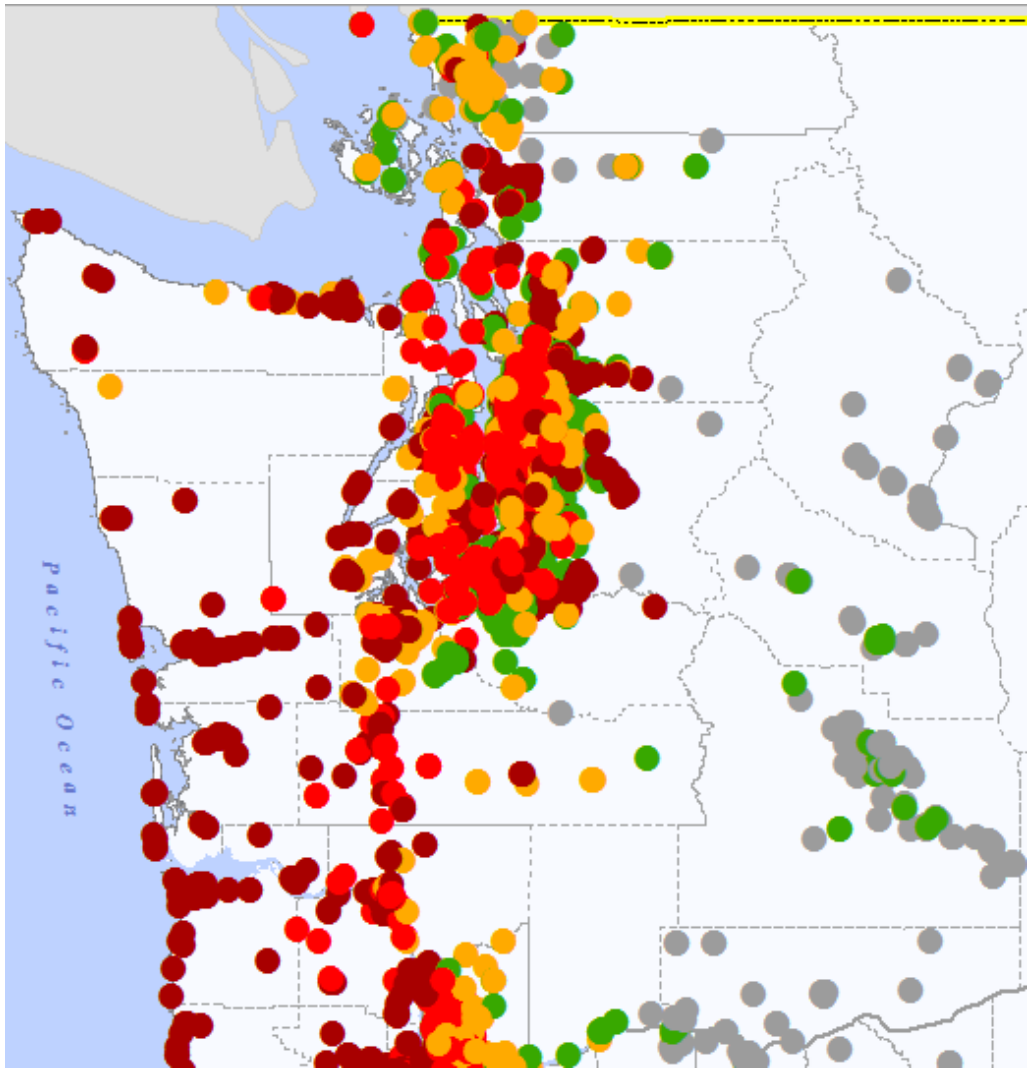
There are 112 in the impacted area
- Approx 36% suffer severe damage
- Approx 17% suffer moderate damage
- Approx 47% suffer slight damage

Total reduction in hospital capacity is projected at 45%

There will be very little hospital capacity west of the I-5 corridor

These numbers identify **Structural** capacity, not patient capacity, which is further reduced due to lack of power, water, sanitation, etc.

Cascadia Impacts



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Schools

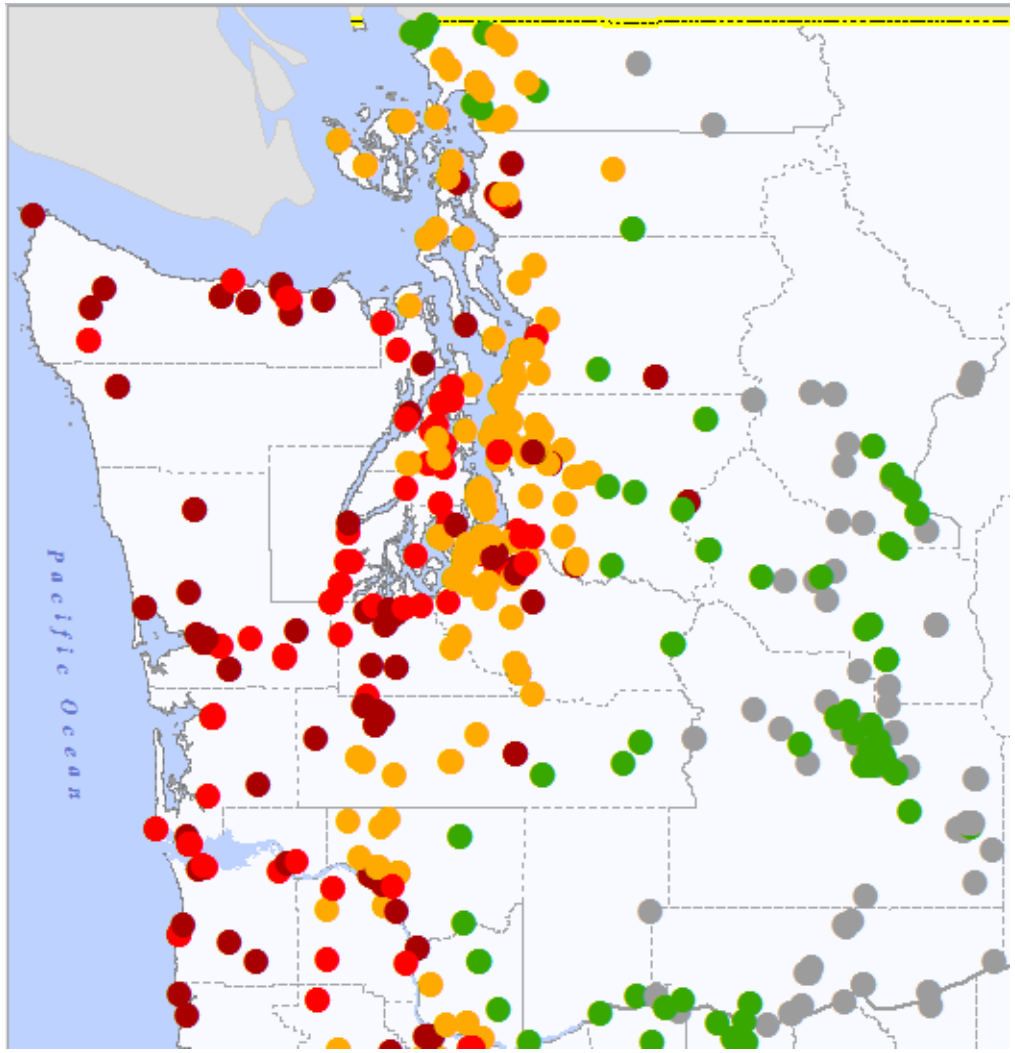
Approximately 2,286 schools in affected area.

Nearly 100% of schools West of the I-5 corridor suffer complete or severe damage, and are likely unusable.

Schools along the I-5 corridor suffer a wide range of damage from complete to slight.

Notable data: All of these schools are part of the National Sheltering System. Their loss indicates a corresponding reduction in sheltering capacity.

Cascadia Impacts



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Communication Facilities

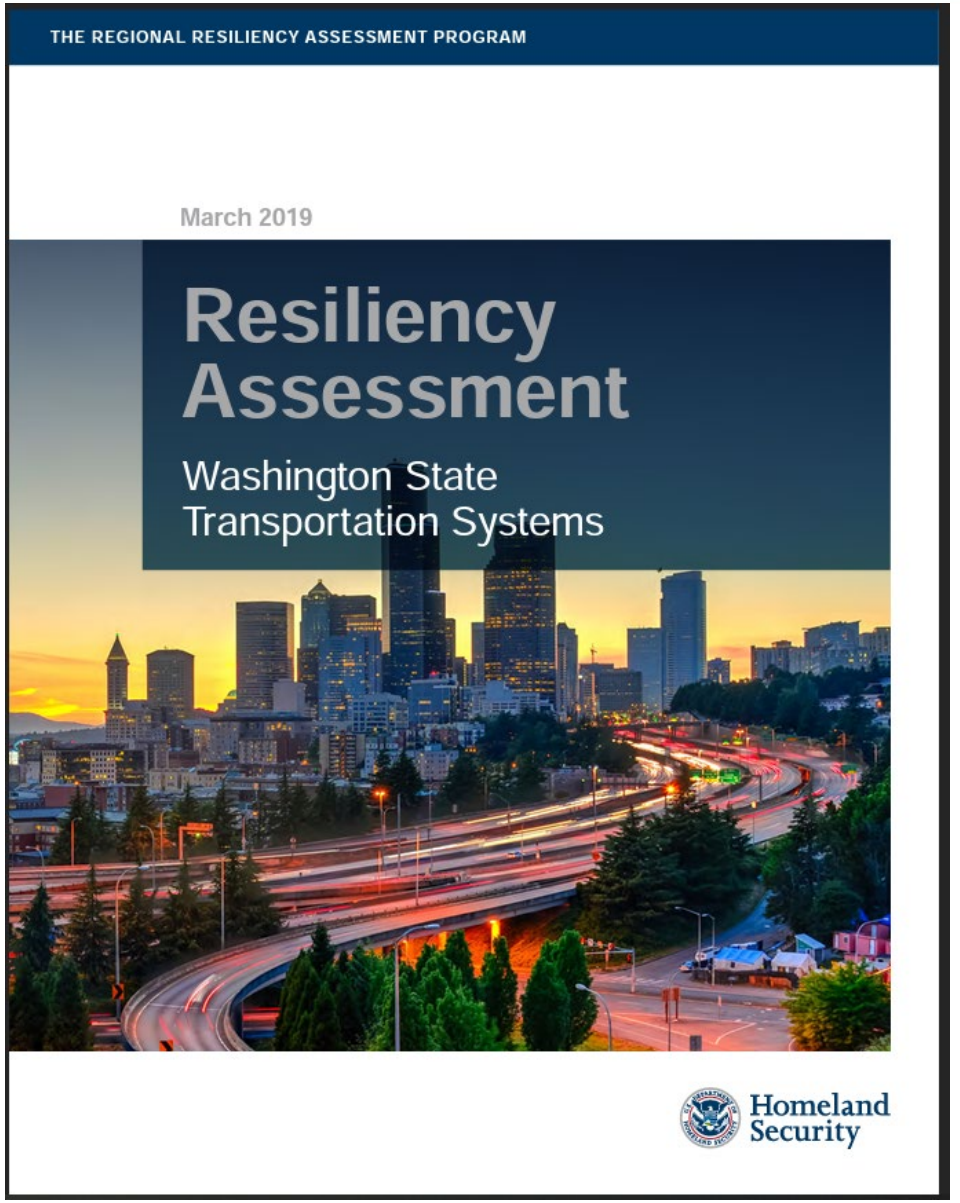
All of these slides represent facilities in the affected area at the time of the FEMA analysis.

Approximately
53 AM Broadcast Stations
42 FM Broadcast Stations
15 TV Broadcast Stations
1 Internet Exchange Point
171 Cellular Towers

Communications infrastructure suffers damage commensurate with the MMI index. Systems are also dependent upon electrical power.

These factors will greatly affect mass communications ability. Does not account for the cellular control facilities and/or switchboards.

Transportation Regional Resiliency Assessment Program (RRAP) Results

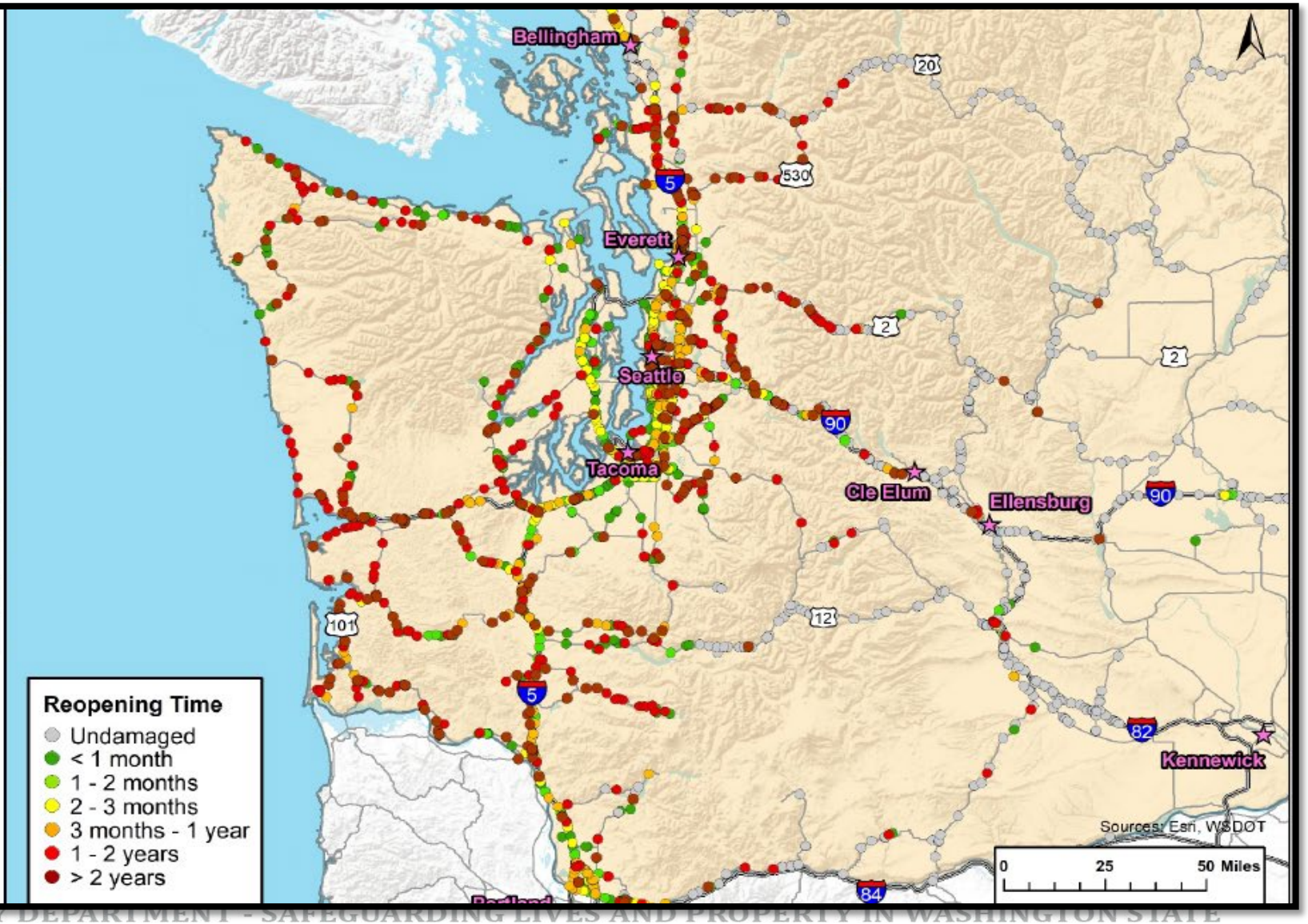


Cascadia Impacts: Bridges

Bridge Reopening Times

Reopening Time	Number of Bridges
None	621
1–14 days	317
2–4 weeks	46
1–3 months	627
3–6 months	165
6–12 months	159
1–1.5 years	304
1.5–2 years	120
2–2.5 years	352
> 2.5 years	6

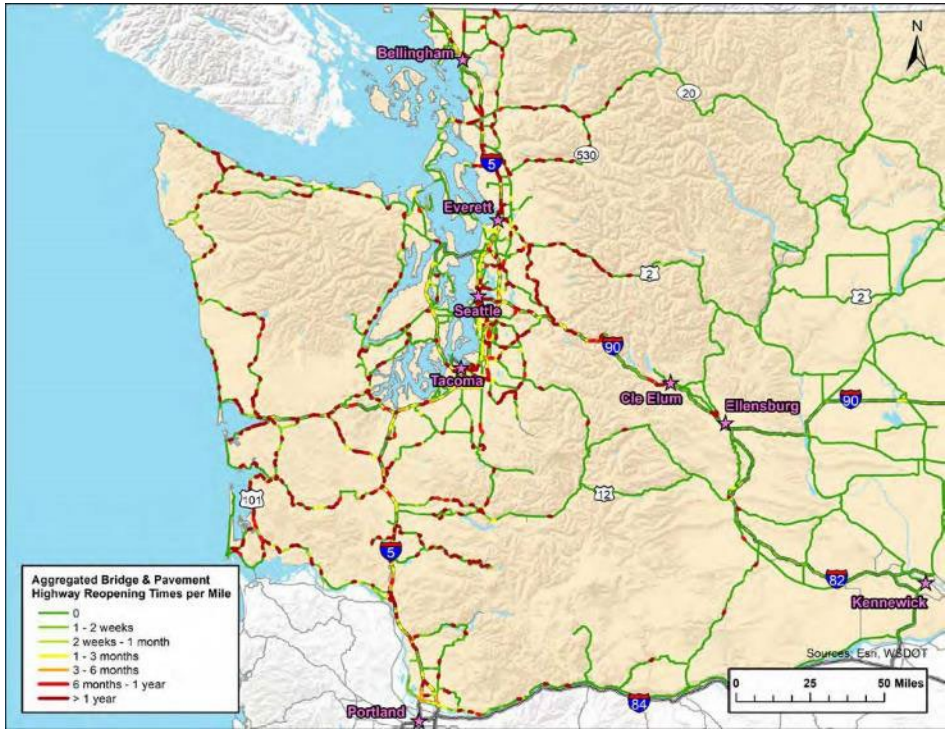
CISA
CYBER+INFRASTRUCTURE



RRAP Conclusions

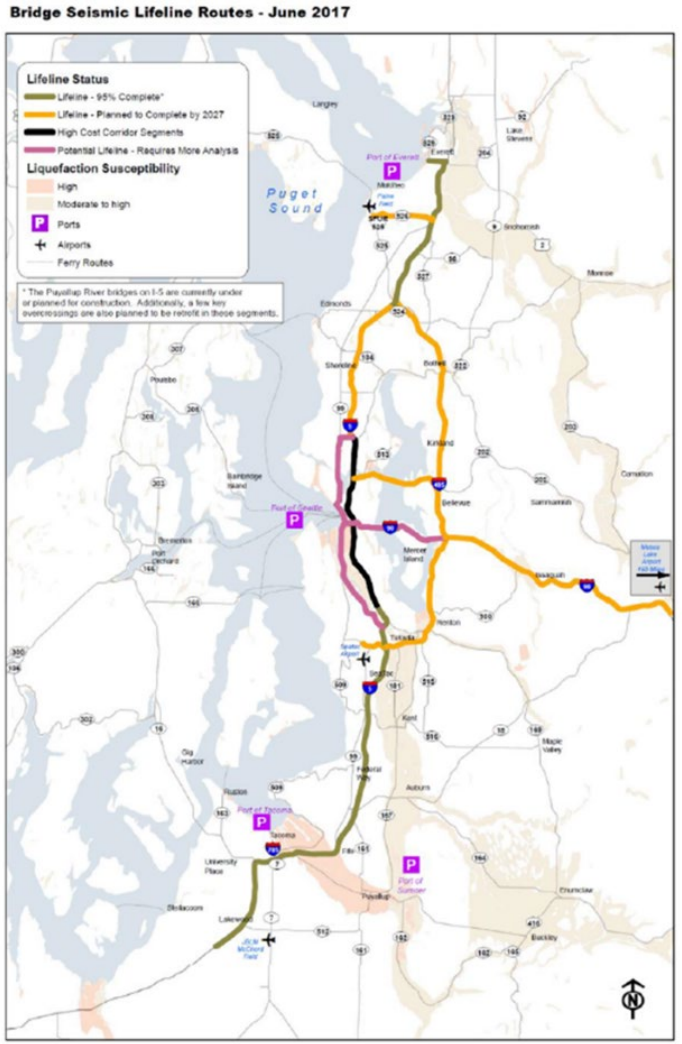
RRAP study revealed opportunities to enhance the resilience of the state's surface transportation infrastructure to better support CSZ earthquake response and recovery efforts by:

- Increase investment in priority highway corridors
- Assess commercial maritime ports throughout the state
- Expand seismic assessment of the state ferry system to better understand it's capabilities to support post disaster response and recovery.
- Enhance engagement with private sector rail companies to better integrate rail capabilities to aid response and recovery



Seismic Lifeline Routes

The primary purpose of the Seismic Lifelines are to prioritize highway transportation routes that will be best able to reopen quickly following a major earthquake to establish post-disaster emergency supply chains between federally designated Incident Support Bases (ISBs) located in central and eastern Washington and Federal Staging Areas (FSAs) located in western Washington. These staging areas are critical locations in state and federal earthquake response plans for bringing life-saving and life-sustaining resources to affected communities.



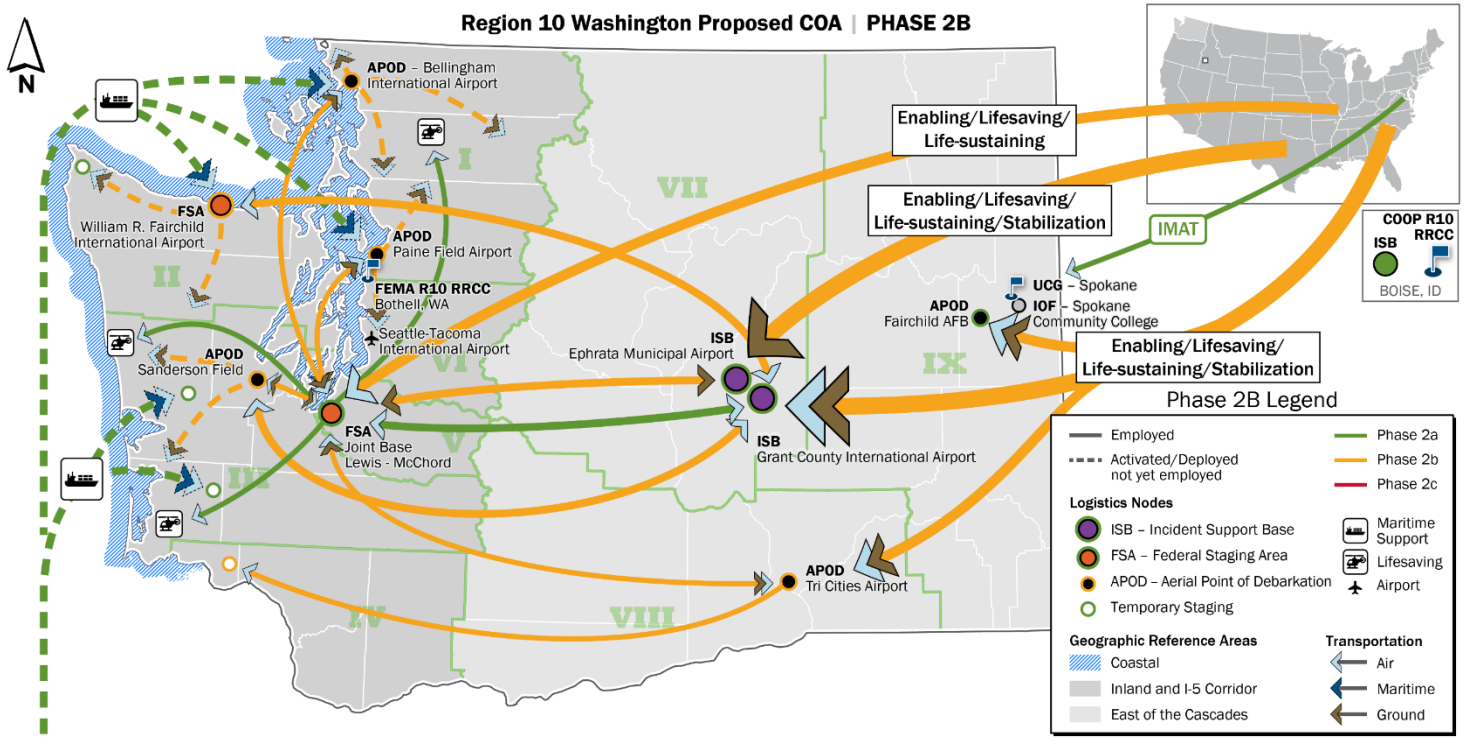
These routes are either currently or in the progress of being retrofitted for improved earthquake survivability. This should not imply that they will be functional or undamaged, but that they have the most likelihood of withstanding an earthquake (not collapse).

- The WSDOT Seismic Lifeline runs north to south along the I-5/I-405 corridor from Paine Field (Snohomish County) to Joint Base Lewis McChord (Pierce County). It runs west to east along the I-90 corridor from Bellevue (King County) to Grant County International Airport in Moses Lake.

Resource Movement

- Grant County International Airport (Moses Lake) and Ephrata Municipal Airport are the Incident Support Bases (ISB)
- There will be a need to prioritize the East/West movement of goods from ISB to State Staging Areas (SSA)
- Goods can then move from SSA into affected jurisdictions.
- Initial resources will focus on assessment, debris clearance, and temporary repairs to transportation infrastructure to enable the movement of commodities.

Concept of Operations – Phase 2b (Community Stabilization)



Aviation RRAP Results - 2021

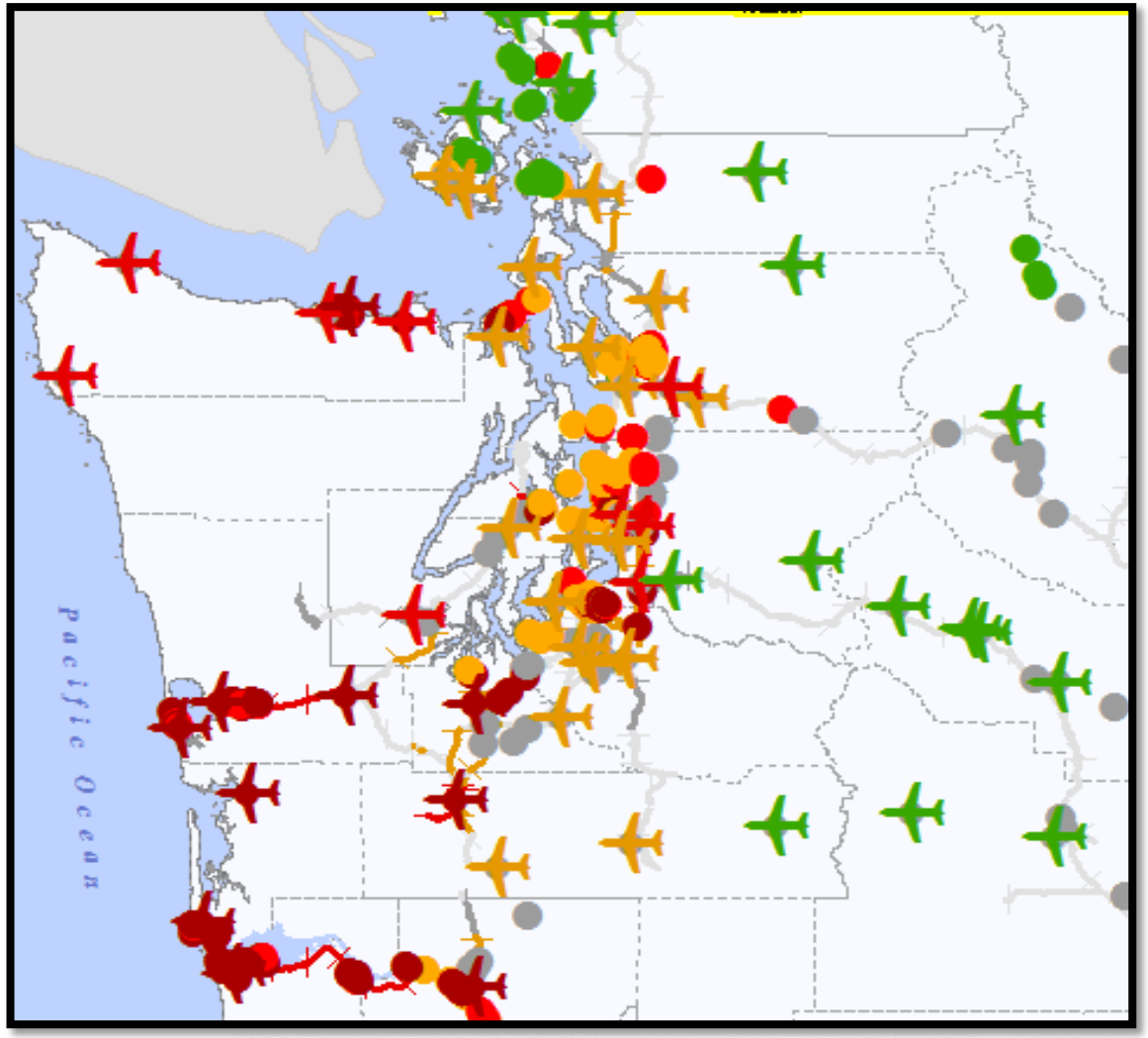
A CSZ earthquake has the potential to significantly disrupt Washington airports—particularly those located in western Washington—as a result of seismic ground motion and ground failure.

- Require more focused, site-specific studies of seismic resilience at airports statewide to better understand the extent to which these disruptions may disable airports from serving as disaster logistics staging areas.

- Airports rely heavily on electric power to maintain full air operations, but the abilities of airports across Washington to manage electric disruptions vary widely.

- Liquid fuel is a vital resource for Washington airports to support sustained post disaster logistics, but the supporting infrastructure and supply chains are vulnerable to the effects of a CSZ earthquake.

Cascadia Impacts: Sea, Air, Rail



- Most facilities west of the I-5 corridor suffer complete to severe damage
- Most facilities along the I-5 corridor suffer severe to moderate damage
- Most facilities east of the I-5 corridor suffer slight to no damage
- Many of these facilities are located in liquefaction zones

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CR 2022 Exercise
June 2022

EMD - CR22 Lessons Learned

- WA EMD hosted a three-day tabletop exercise focused on Critical Transportation and Mass Care Services
- Need to better understand the potential timeline for the reopening of east/west routes as these support the delivery of lifesaving/life sustaining supplies and the evacuation of survivors
- Align local and tribal priority routes with state routes for debris removal, emergency repair and reopening

Take Aways

- Direct and resource an analysis of east/west routes with emphasis of the movement of goods from the State Staging into the affected area.
- Invest in lifeline bridges to a recovery standard versus the previous life safety standard.
- Direct and resource an assessment of maritime resilience, specifically port/harbor infrastructure and response capability.

Food for Thought

- Are we willing to pay now for post incident functionality?
- To which standard do we build?
  - Roads and bridges
  - Public safety facilities
  - Schools
  - Critical infrastructure
- What do we retrofit and to which standard?
- Do we stockpile? If so, what?
- Which capabilities do we build or enhance?

ONE MITIGATION DOLLAR SPENT EQUATES TO SIX RECOVERY DOLLARS SAVED

Recommendations to Elected Officials

- Develop a seismic resilience strategy that includes multimodal transportation, public structures, high risk buildings, communications, etc.
- Invest in resilient and survivable transportation and communications
- Complete identification and assessment of our high-risk buildings
- Retrofit our high-risk buildings (URM's, schools, hospitals etc.)
- Require certain school and public buildings to be built to an immediate occupancy standard
- Plan for limited stockpiling of certain critical commodities for key responders (Police, Fire, EMS, Medical)

Questions

This Presentation Brought to you by Uncle Sam!

Sign up now and avoid the rush!

Your Uncle would love to hear from you!

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