

WSDOT Aviation Division:

Aviation Emergency Services and the Cascadia Subduction Zone

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WSDOT Aviation Statewide Workshops

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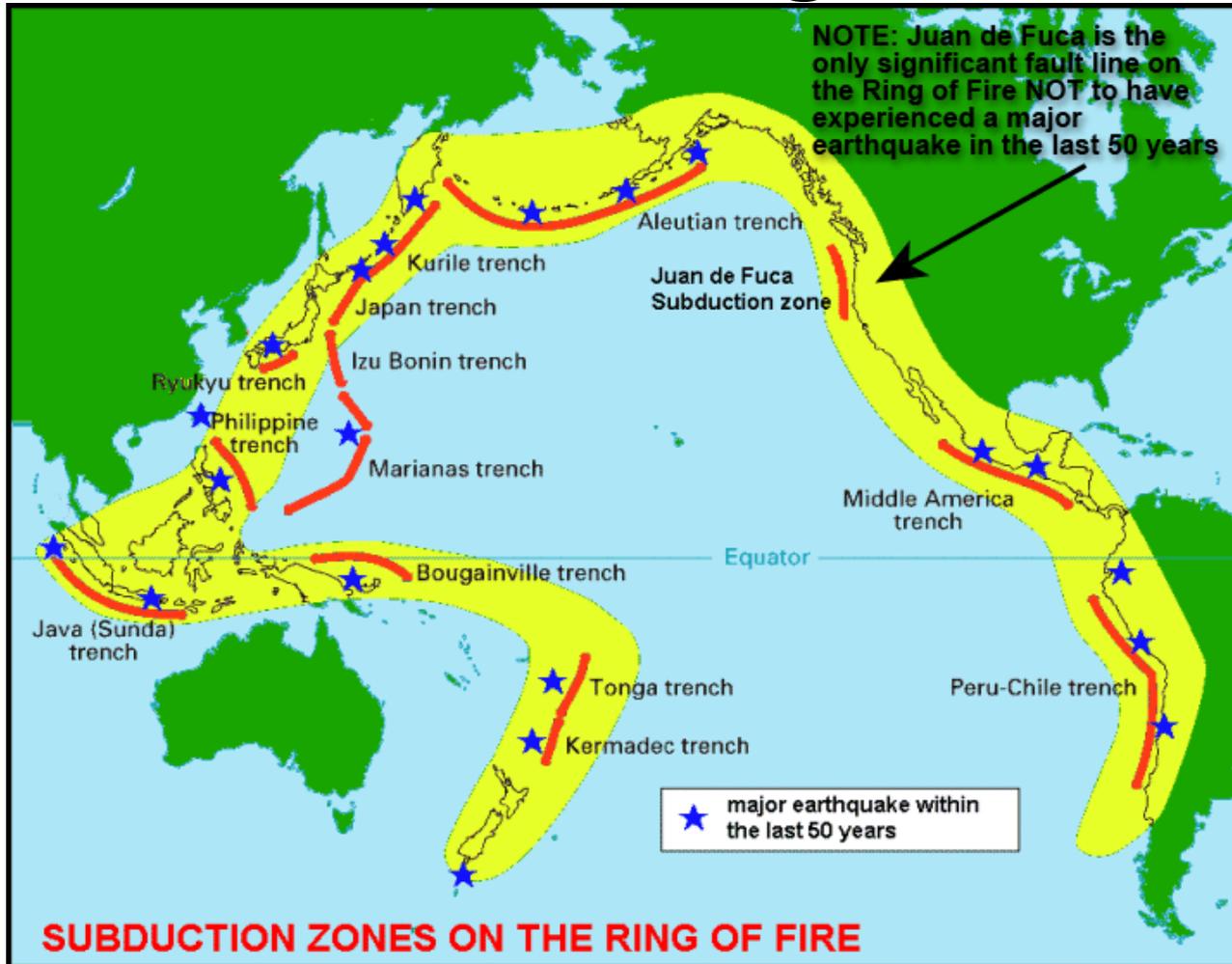
Legal statutes regarding WSDOT Aviation's role in Emergency management

*Washington State Law specifies that WSDOT Aviation is the lead agency for the coordination of **Air Search and Rescue** and **Aeronautics** within the state. The references are **RCW 47.68** and **468-200 WAC**.*

WSDOT Aviation is a part of the statewide emergency management system, representing portions of both Emergency Support Functions (ESF) 1 (Transportation) and 9 (Search and Rescue) under the control of the Emergency Management Division and the Governor of Washington.

Overview of the Cascadia Subduction Zone

Ring of Fire



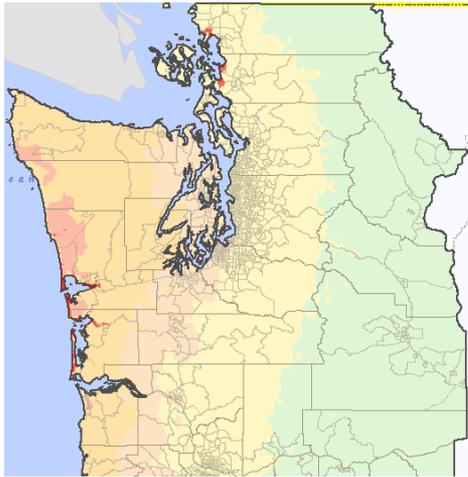
The Ring of Fire accounts for 90% of all earthquakes, and 81% of the world's largest earthquakes

Subduction zones are shown in red

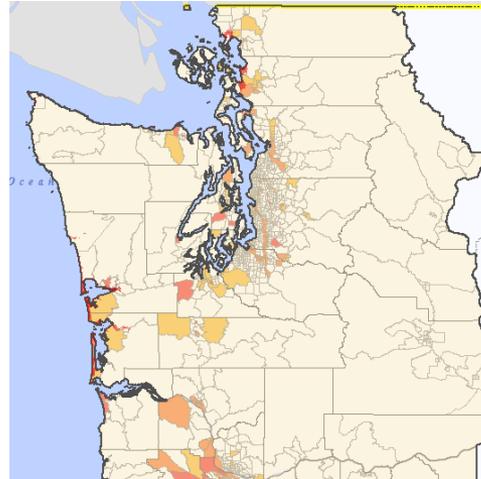
The CSZ fault line is part of the Ring of Fire

The CSZ is the only significant fault line on the Ring of Fire without a major quake in the last 50 years (see blue stars)

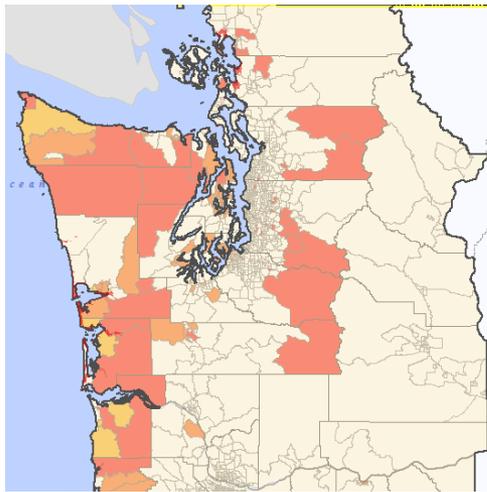
Mercalli Index Ground Shaking Effects



Liquefaction



Landslides



Tsunami



Mercalli Index: Ground shaking will depend on the actual fault rupture method and can not be accurately forecast. It is anticipated that the fault will rupture along its entire 800 mile length resulting in a magnitude 9.0 earthquake that will last 4-10 minutes. The intensity of the shaking will decrease with distance from the fault. Even so, Seattle is expected to experience a 7.0 magnitude or higher earthquake with 5 minutes of shaking.

Liquefaction: The cause of some of the most dramatic damage resulting from an earthquake, liquefaction areas can be accurately forecast based on soil types and water content. Some of the most susceptible areas are areas that have a high commercial potentiality, i.e. ports, bridges, commercial areas.

Landslides: Landslides will occur up to hundreds of miles from the fault due to the intensity of the shaking. Landslide potential significantly increases with water content. If the CSZ rupture occurs during the rainy season, landslides will be most prolific. Fortunately most of the landslides will occur in sparsely populated areas due to the existence of unoccupied terrain in the mountainous regions.

Tsunami Inundation: Tsunami's are historically the biggest killer associated with earthquakes. The residents most affected are along Pacific Coastal areas. The numbers in jeopardy will increase sharply in summer months. Current estimates place as many as 50,000 residents in the hazard zone in February.

FEMA Effort & Modeling

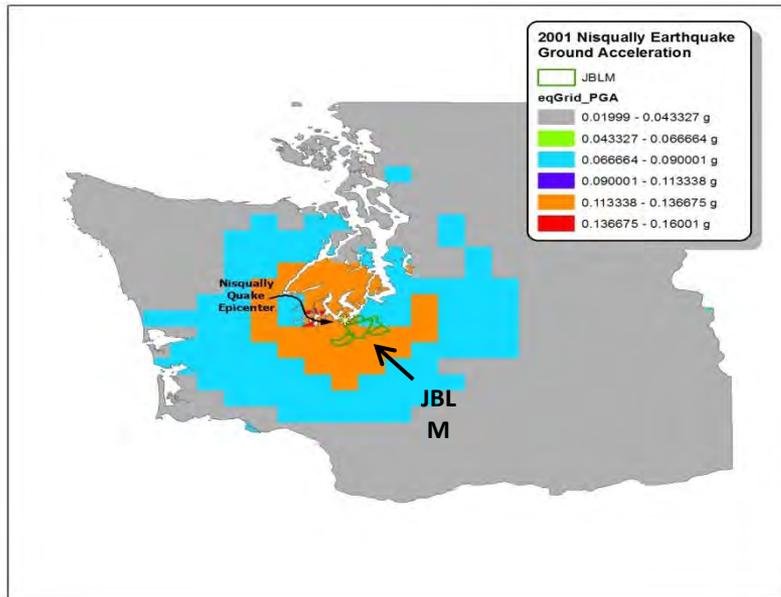
- FEMA commissioned a multi year *HITRAC scientific study and produced the Federal Response Plan (Published December 2013)
- Modeling Factors
 - February 6, 9:41am PST, weekday
 - Complete rupture of the CSZ fault line
 - Epicenter 60 miles off Oregon coast, 120 miles West of Eugene
 - M9.0 earthquake, with ground shaking up to 5 minutes
 - Tsunami wave heights 12 to 40 feet at landfall
 - Aftershocks of M7.0 or greater
 - Additional tsunamis caused by aftershocks

Note: Damage caused by aftershocks, follow on tsunamis, and secondary effects is not included in damage estimates

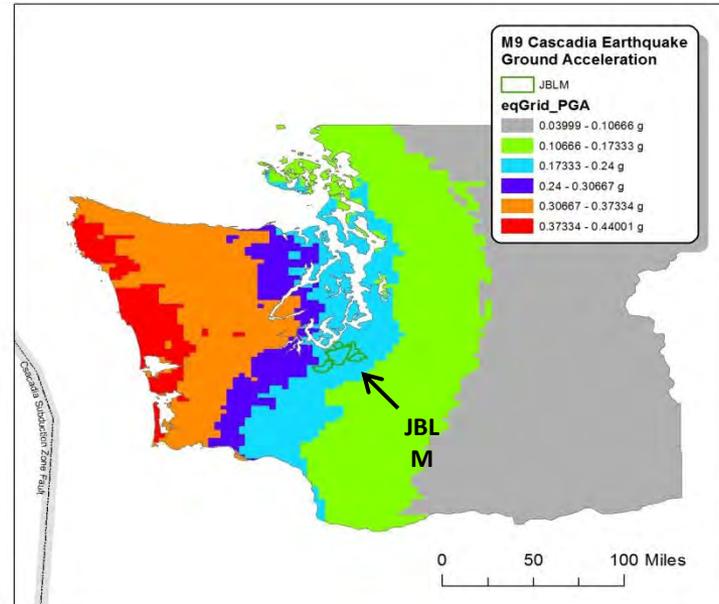
Planning Factors (FEMA)

	Washington Total	Notes
Land Area (Sq. Miles)	71,303	
Miles of Pacific Coastline	157	Does not include Strait of Juan de Fuca or shores of Puget Sound.
Population	6,894,121	
Population exposed to tsunami	50,190	
Residential buildings damaged (Slight to complete damage)	507,701	
Short term human sheltering requirements	410,127	
Short term pet sheltering requirements	254,357	
Mass feeding and hydration requirements (People)	1,274,327	
Mass feeding and hydration requirements (Pets)	777,340	
Deaths	8,440	Projection accounts for initial earthquake and tsunami, does not account for exposure, disease, dehydration, starvation, or follow on tsunami's and aftershocks.
Injuries	12,114	
Hospital patient evacuation requirements	15,501	Evacuation requirements based on projected numbers of facilities determined to be unusable. Does not account for evacuation to create room for newly injured.
Nursing home patient evacuation requirements	65,249	
Building debris (Cubic Yards)	13,174,243	

Ground Motion Comparison

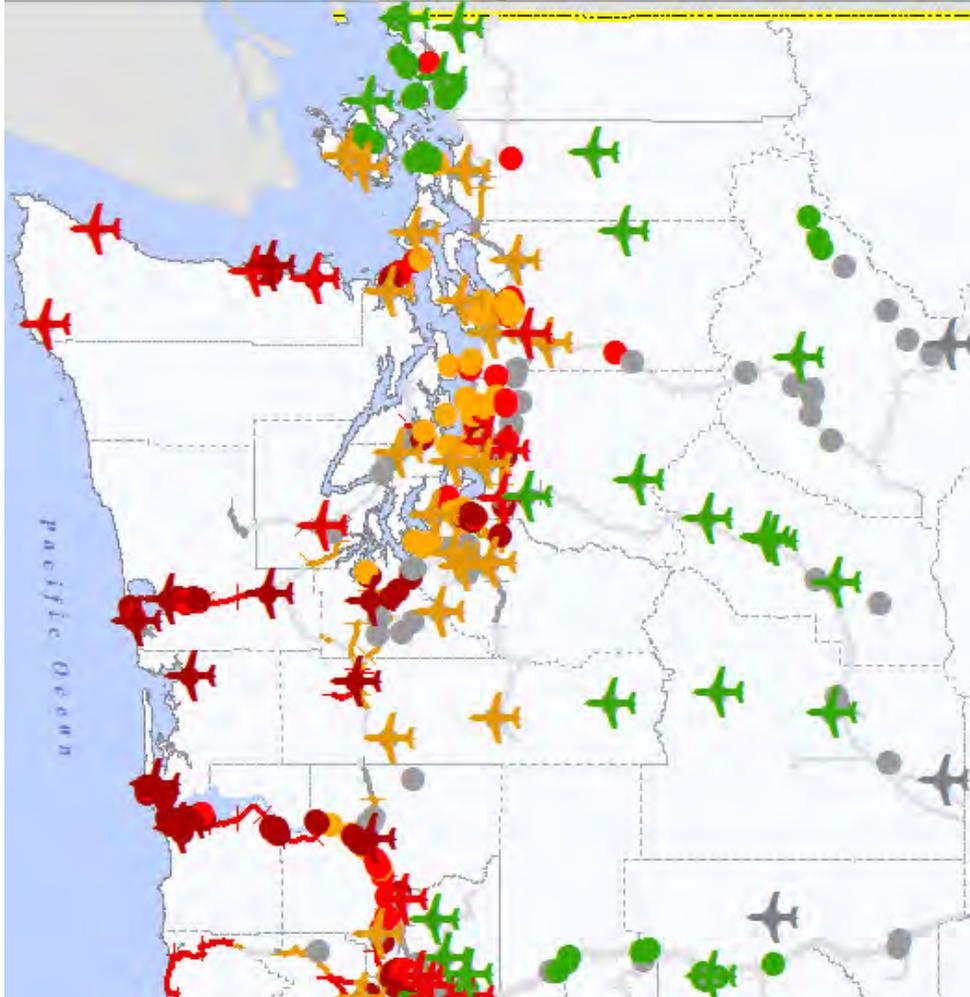


Nisqually 6.8



Cascadia 9.0

Transportation - 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

Implications on State-Wide Aviation

- Significant Effects:
 - Building damage
 - Tsunami effects on the coasts
 - Power outages
 - Runway/taxiway/apron damage
 - Liquefaction
 - Radar/ATC outages.
- Airfield assessment efforts depend on fast, accurate reporting from airport managers or their representatives.

WSDOT Aviation Response Plan

- First, we need to get your help in maintaining our existing airport databases currently on our website
- Next, after the event, we need to know your current status and who we can contact
- Then we will need to know what we can do to help

WSDOT Aviation

Information Tracking Focus

- Track airport infrastructure:
 - Overall airport status
 - Runway status
 - Taxiway status
 - Ramp capacity
 - IFR status
 - Tower status
 - Fuel status
 - Communications status
 - Ground support equipment capability
(number/type/maintenance status/operators)
 - Storage capacity, such as parking lots, cargo hold areas, etc

How Do We Gather This Information?

- WSDOT AIS Portal at: <http://www.wsdot.wa.gov/Aviation/>
- WISE Mapping system at: <http://wise.mil.wa.gov/logtest/Register>
- **When the big one hits:**
 - We ask that an airport representative call, email or get to WSDOT Aviation with changes/updates to the airport
 - If we do not hear from you, we will go to you
 - If you don't know, tell us what you do know and we'll take care of the rest (especially if it a serviceability or fuel contamination issue)

Why do we need the information?

- We are asking for a lot of detailed information because we expect to use your Airports to support disaster relief
- The biggest roles will be:
 - ***Supporting refueling*** of both civil and military aircraft
 - ***Supporting the flow of relief supplies and personnel.***
 - The main staging area will be Fairchild AFB (as well as possibly Moses Lake/Grant County Int'l and Walla Walla) and everything will flow from the Eastside to whatever survives on the Westside
- ***Without detailed capabilities, we cannot get critical information to the logistics and air ops planners***

Key Takeaways

- WSDOT Aviation is committed to working with all emergency management partners to help coordinate aviation search and rescue
- We are not going to take over your airport nor is the military going to do so. The role, by law, of WSDOT Aviation and the military are to support local jurisdictions and coordinate relief efforts when asked
- WSDOT Aviation is **dedicated** to working with the aviation community as a whole
- **The CSZ is real and we are preparing for it.**
 - WSDOT Aviation was a key participant in exercise **Evergreen Tremor** in June 2015
 - Key participant in the international-level CSZ exercise in June 2016 called **Cascadia Rising**

For More Information Please Contact

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