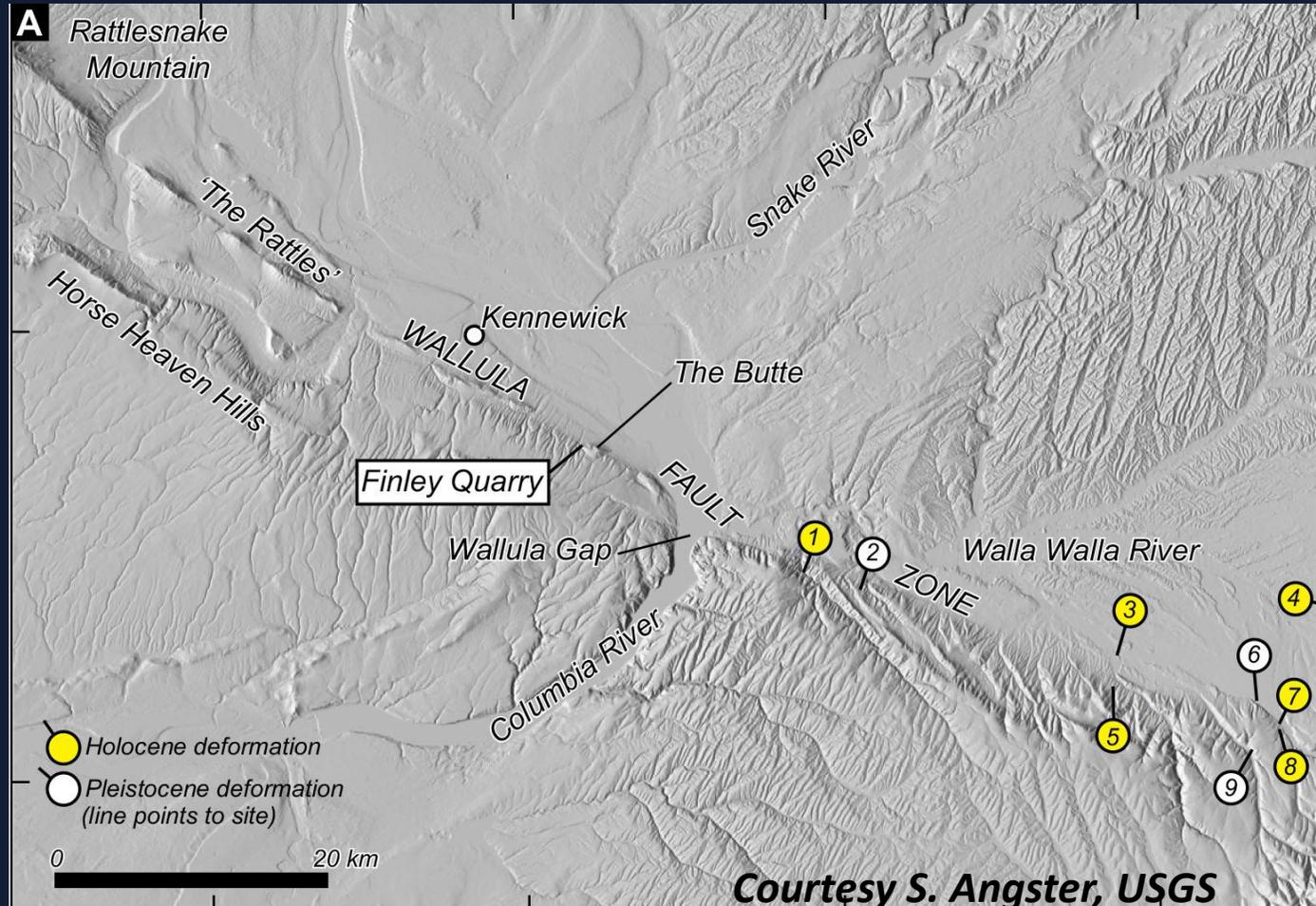


Earthquakes in Washington: Why they exist and what we know about them

Megan Anderson, Washington Geological Survey



What is an earthquake? First you need a fault...

“Reverse”

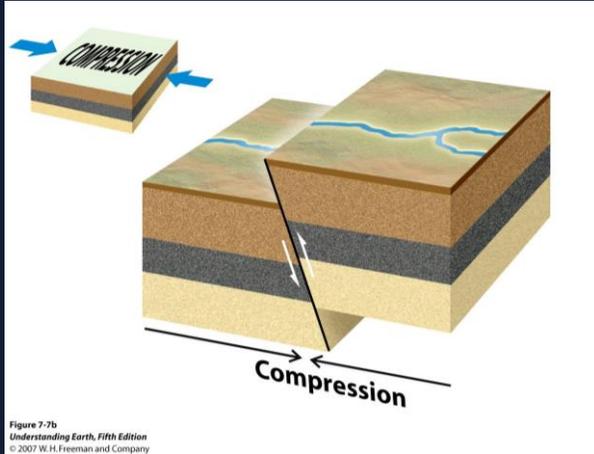


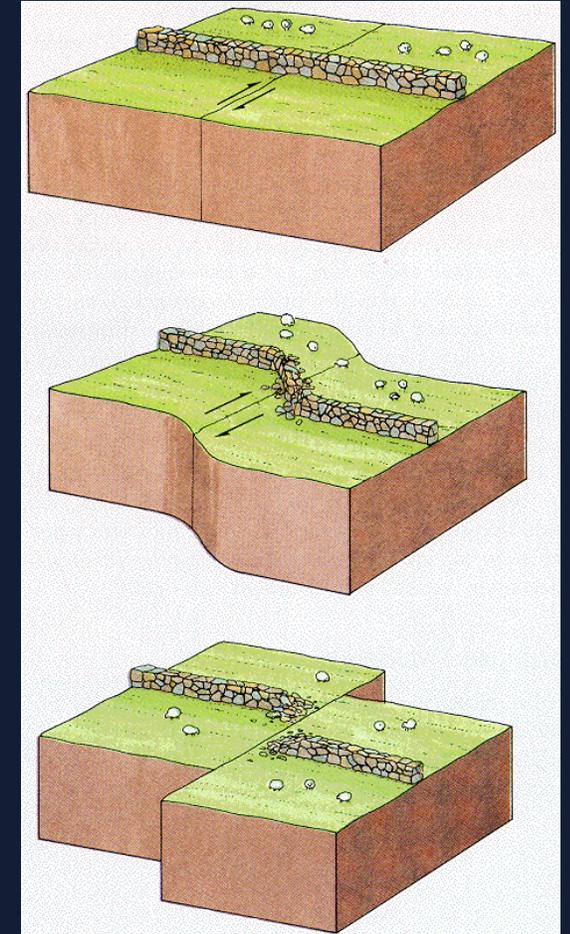
Figure 7-7b
Understanding Earth, Fifth Edition
© 2007 W.H. Freeman and Company

Faulting is a type of deformation or *shape change* by breaking rocks



Figure 7-1b
Understanding Earth, Fifth Edition
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An earthquake happens when...



“Strike-slip”

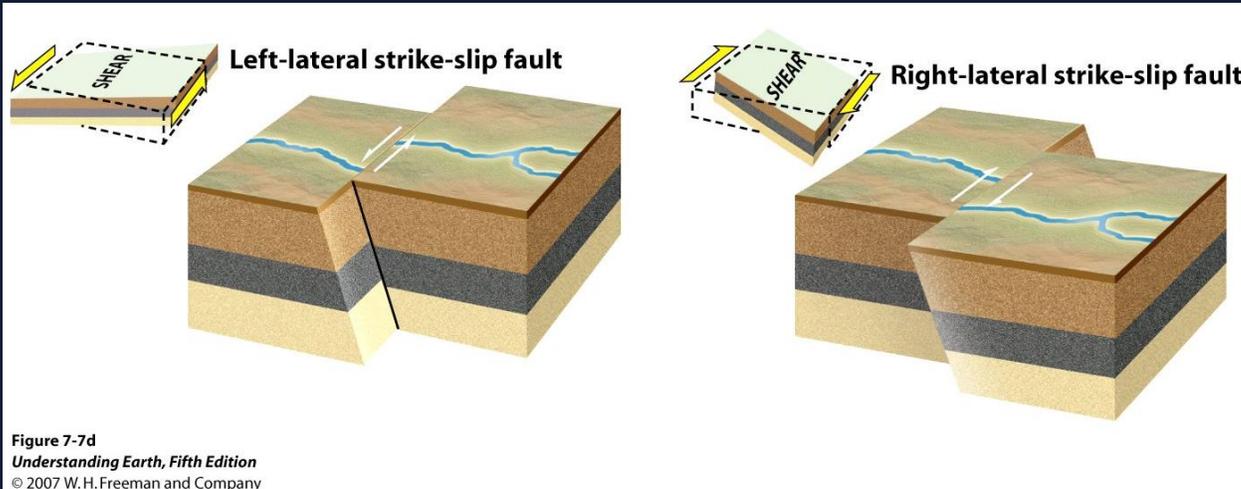


Figure 7-7d
Understanding Earth, Fifth Edition
© 2007 W.H. Freeman and Company

1. Attempted deformation
2. “Elastic” deformation
3. “Brittle” deformation or breaking → earthquake!

What is an earthquake? First you need a fault...

"Reverse"

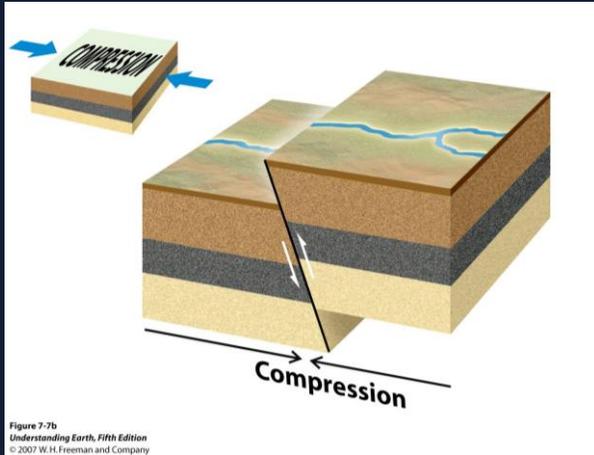


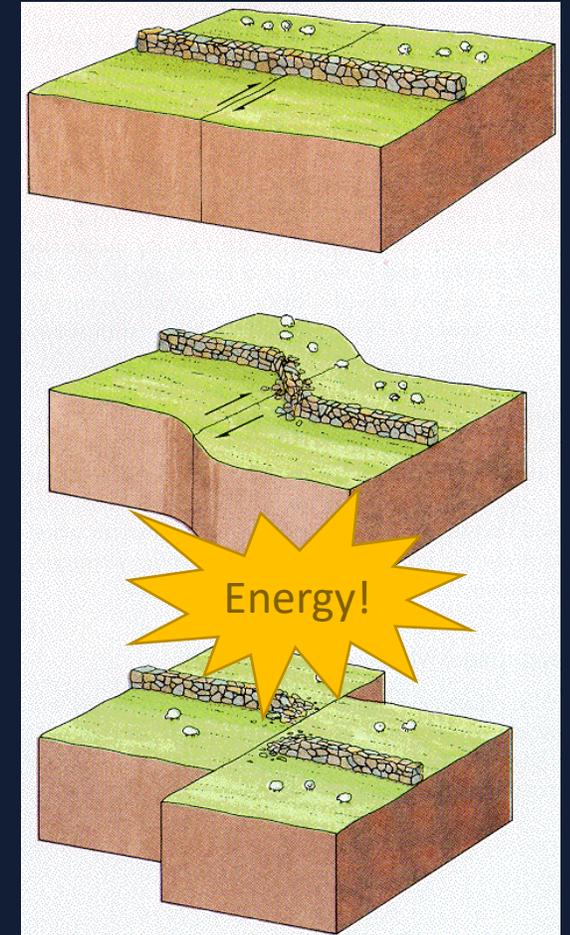
Figure 7-7b
Understanding Earth, Fifth Edition
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Faulting is a type of deformation or *shape change* by breaking rocks



Figure 7-1b
Understanding Earth, Fifth Edition
© 2007 W.H. Freeman and Company

An earthquake happens when...



"Strike-slip"

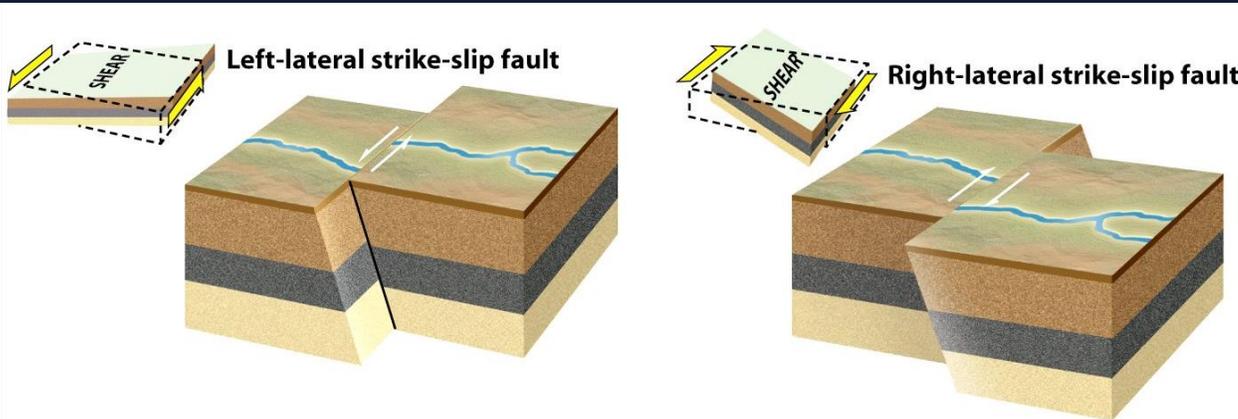
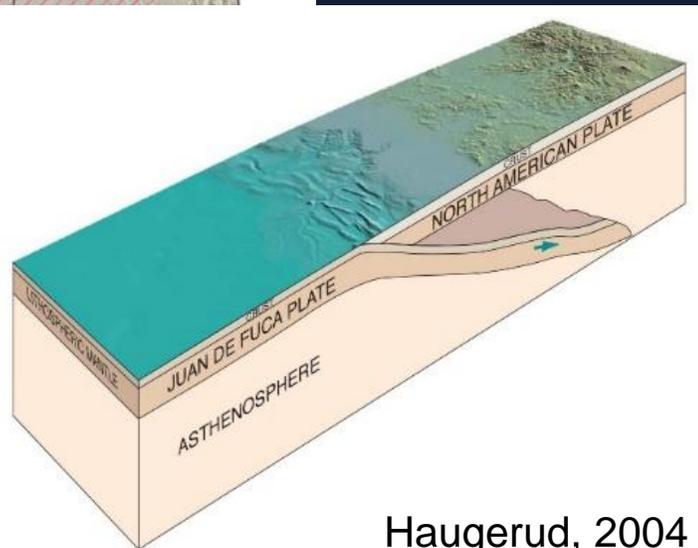
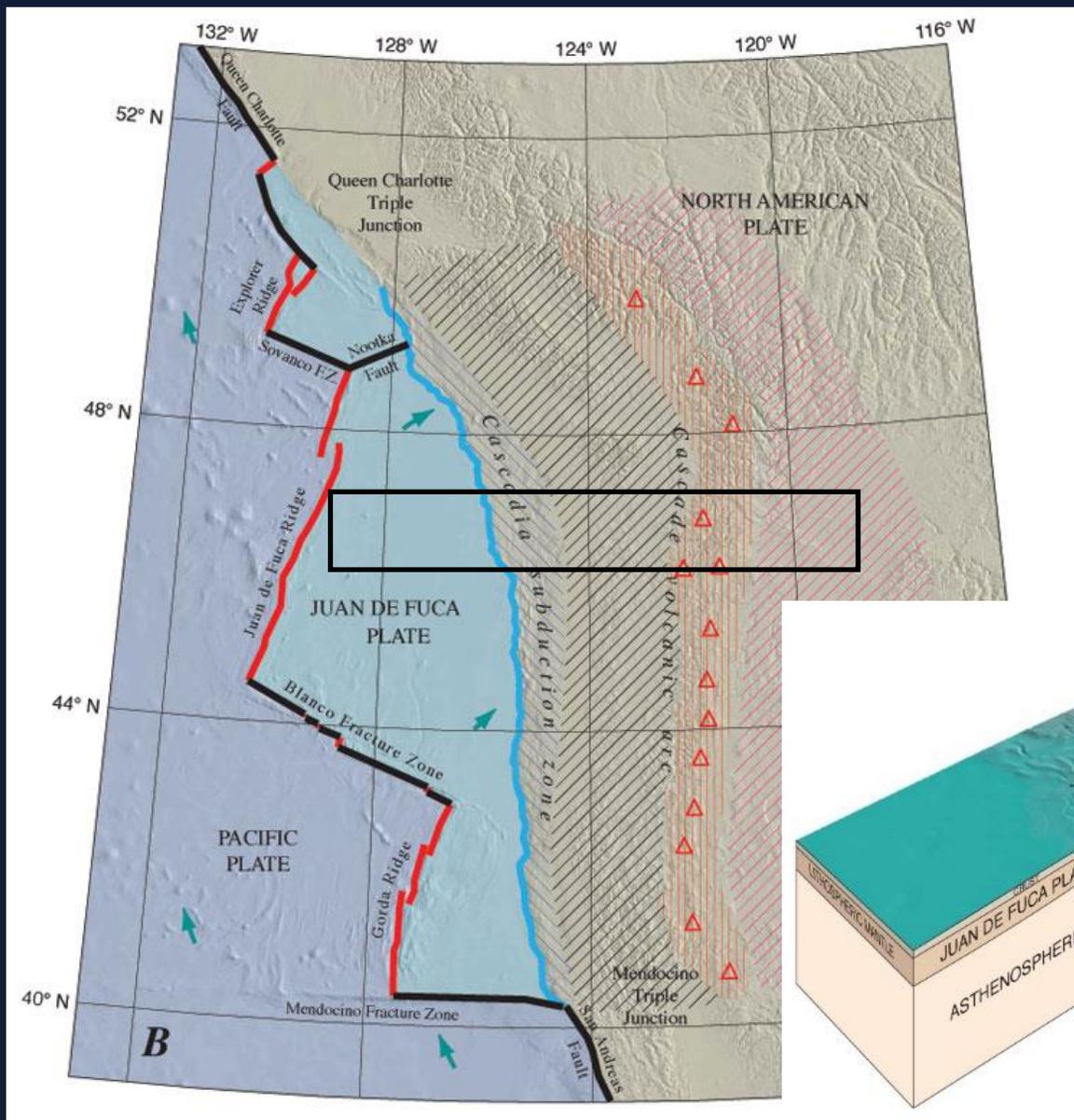


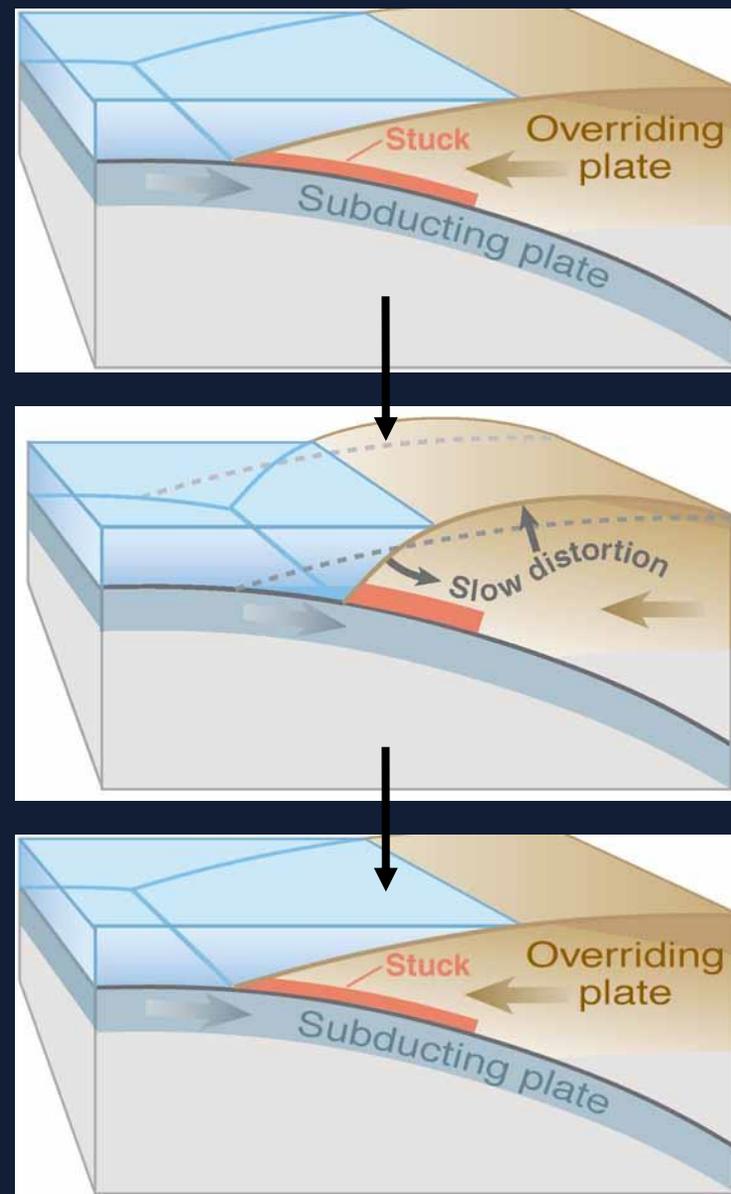
Figure 7-7d
Understanding Earth, Fifth Edition
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1. Attempted deformation
2. "Elastic" deformation
3. "Brittle" deformation or breaking → earthquake!

What makes faults in Washington?



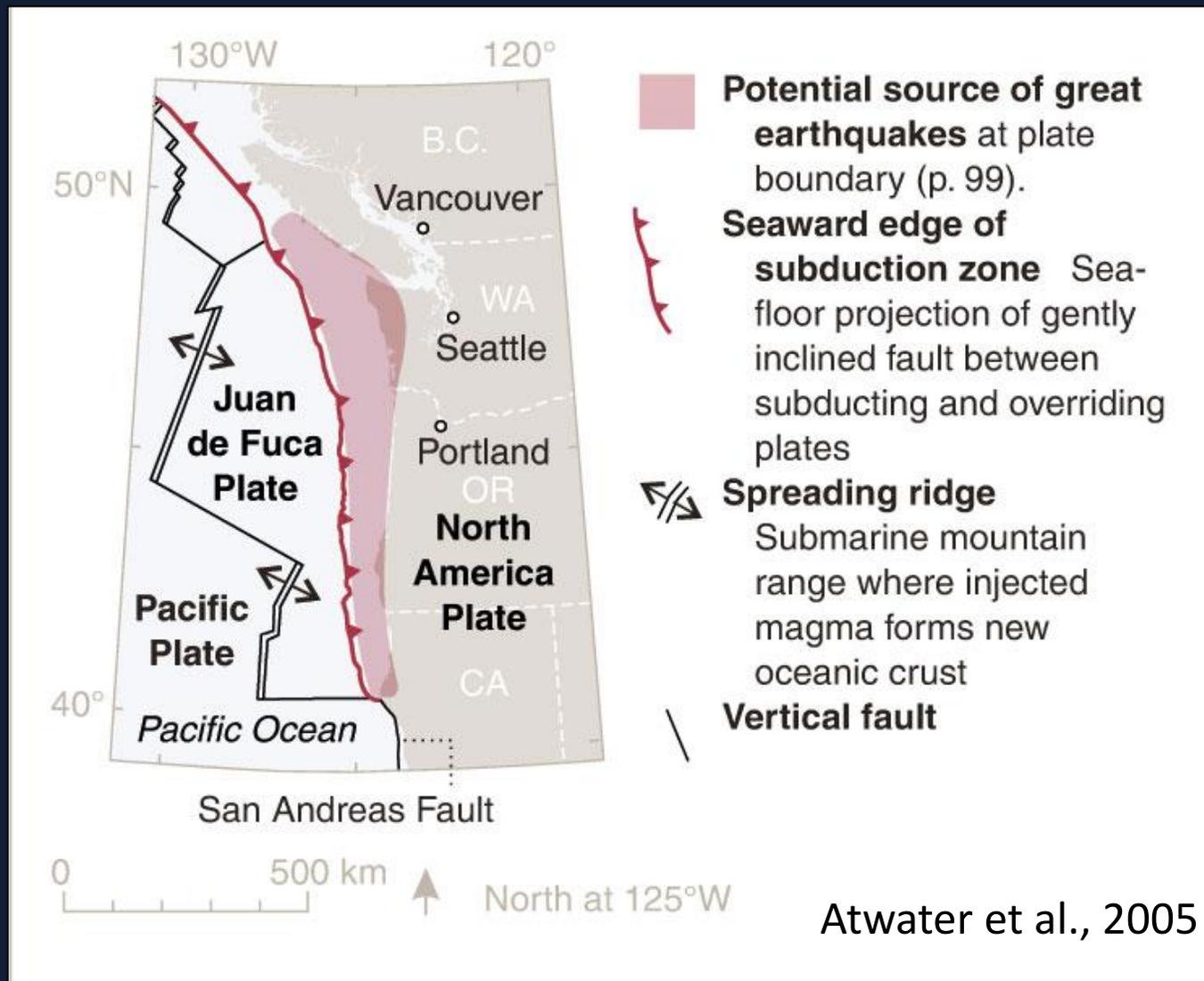
Haugerud, 2004



What makes faults in Washington?

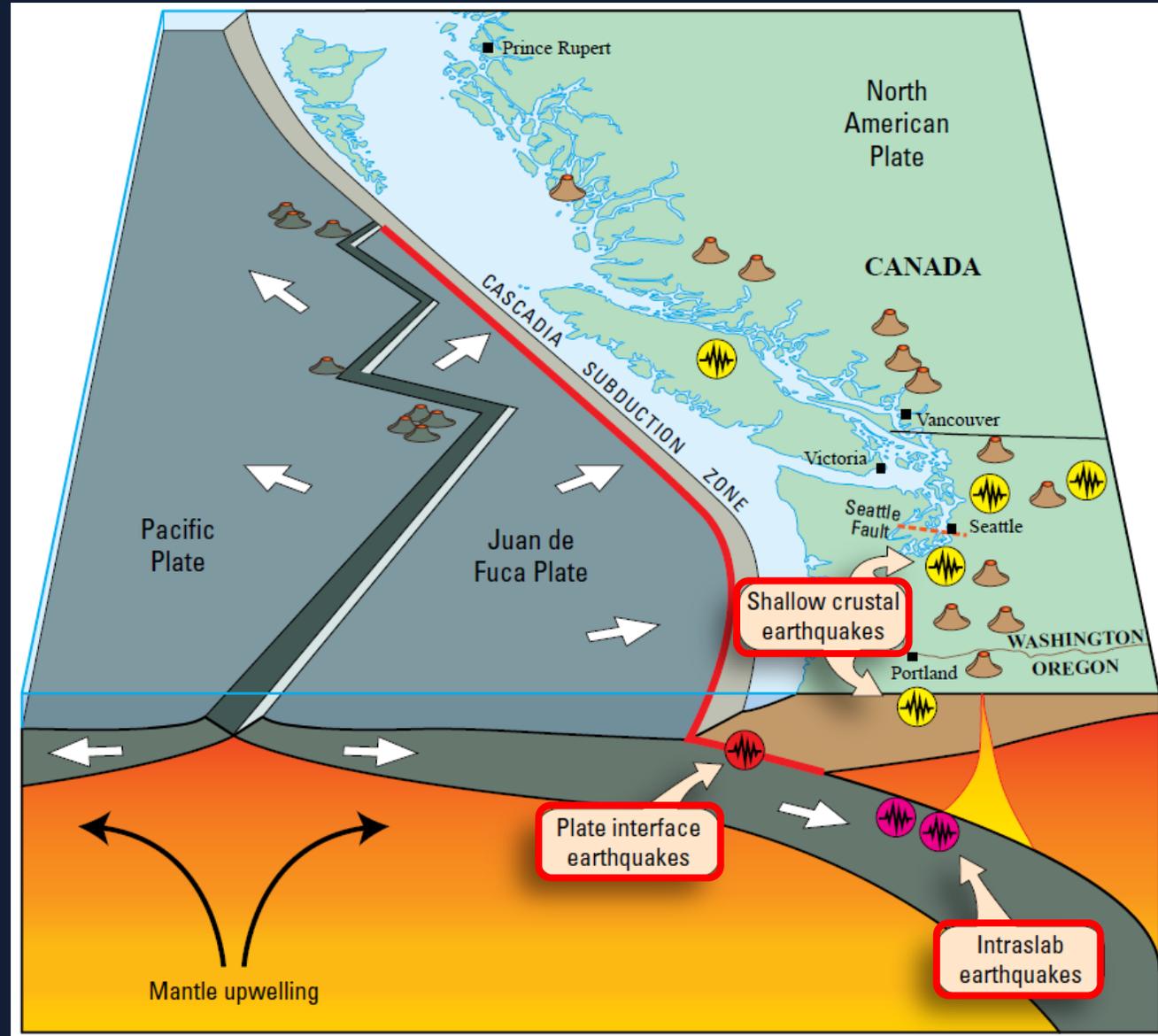
New Yorker:
The Really
Big One

This image and
article is just
a wee bit
exaggerated!

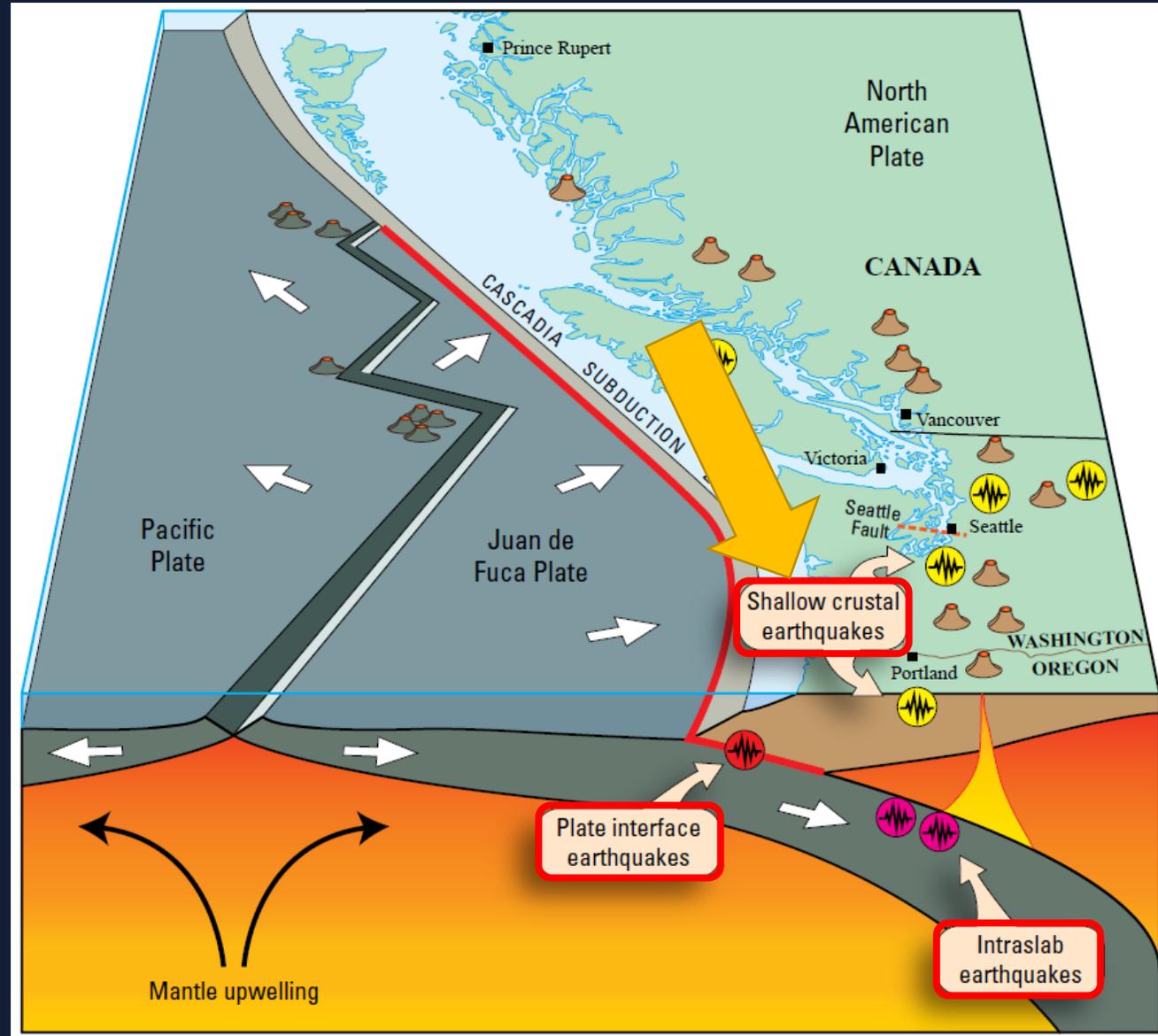


A very long fault can make a very large magnitude earthquake.

The big fault will be a disruption to all of Washington, but there are other faults that should concern us too...



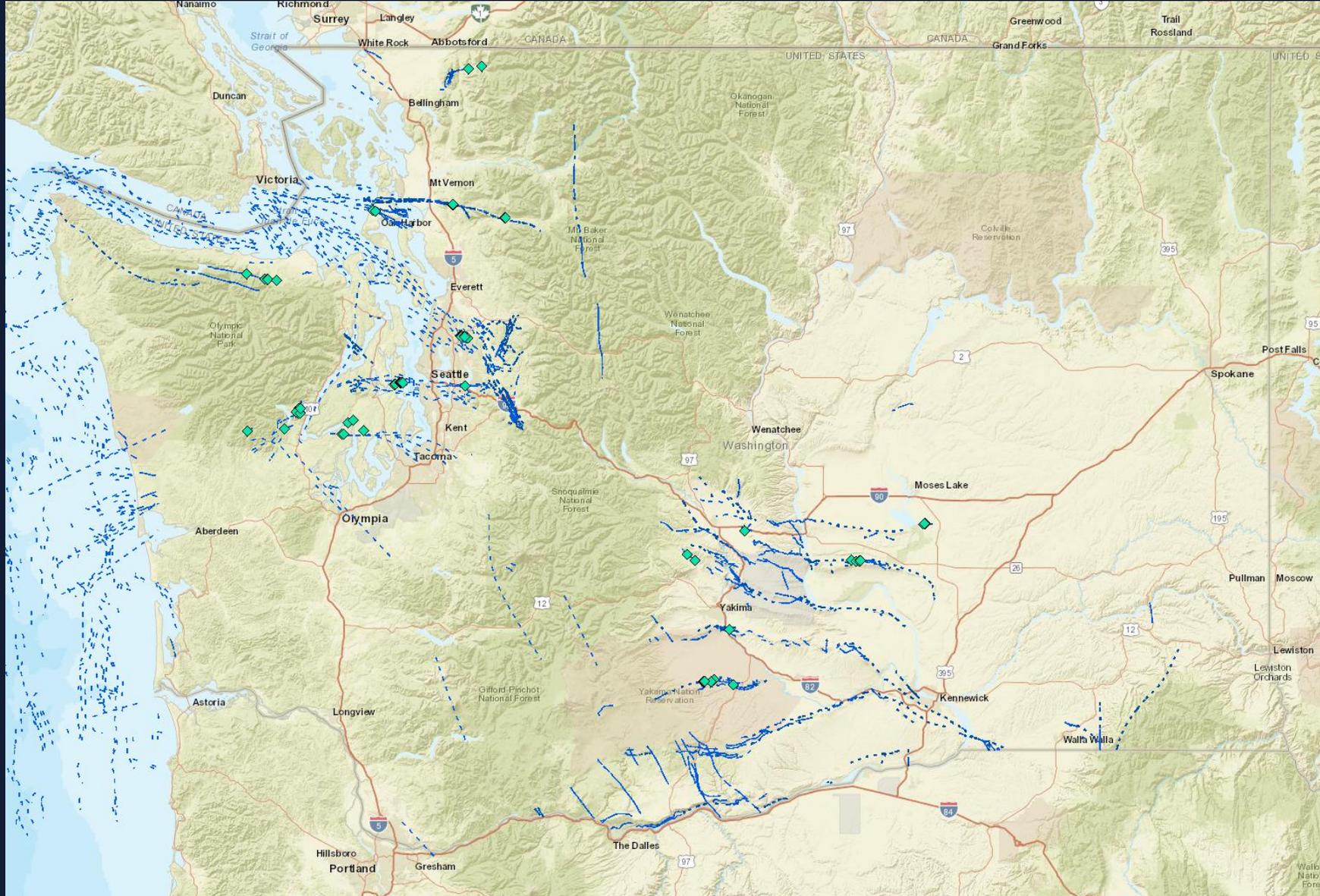
The big fault will be a disruption to all of Washington, but there are other faults that should concern us too...



This image doesn't show much of eastern Washington. That doesn't mean we don't have earthquakes there...

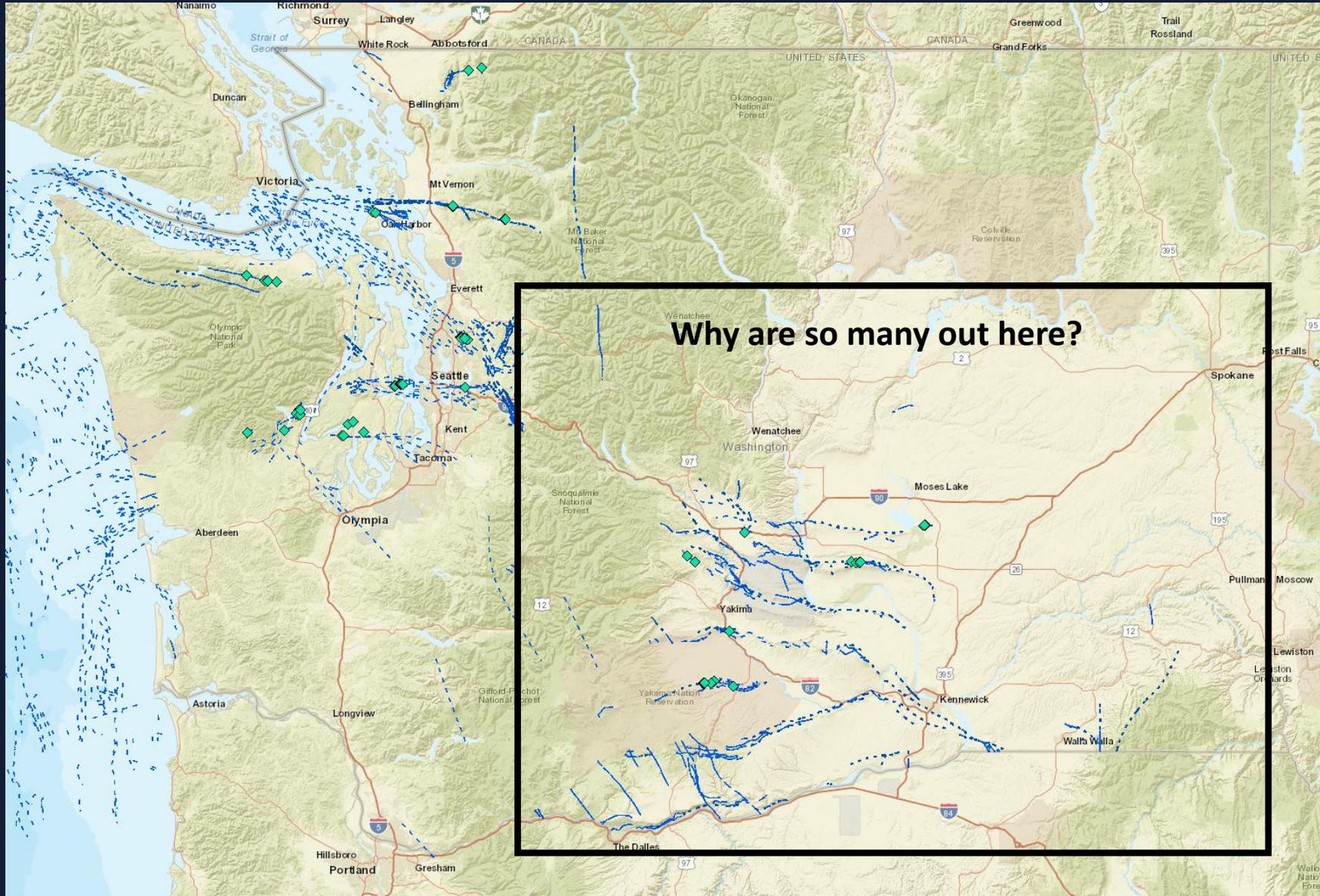
There are many active “crustal” faults in Washington

Washington Geological Survey Information Portal



There are many active “crustal” faults in Washington

Washington Geological Survey Information Portal



Why *are* there faults in the crust of Washington?

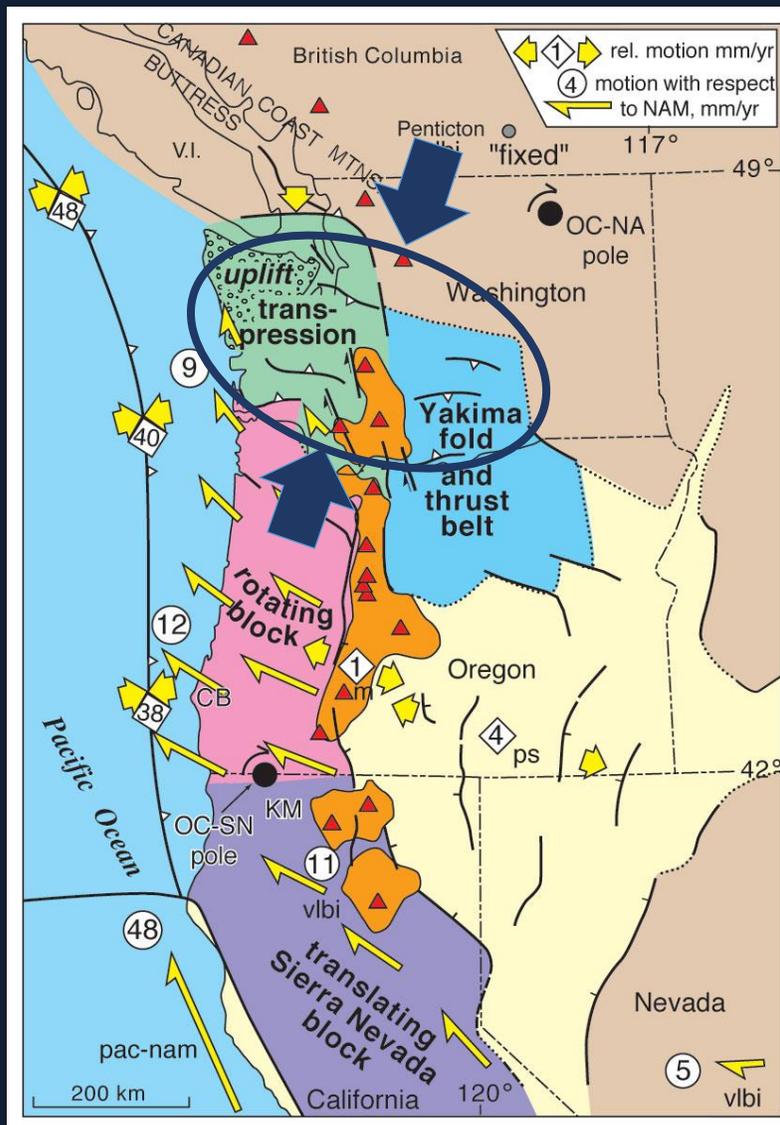
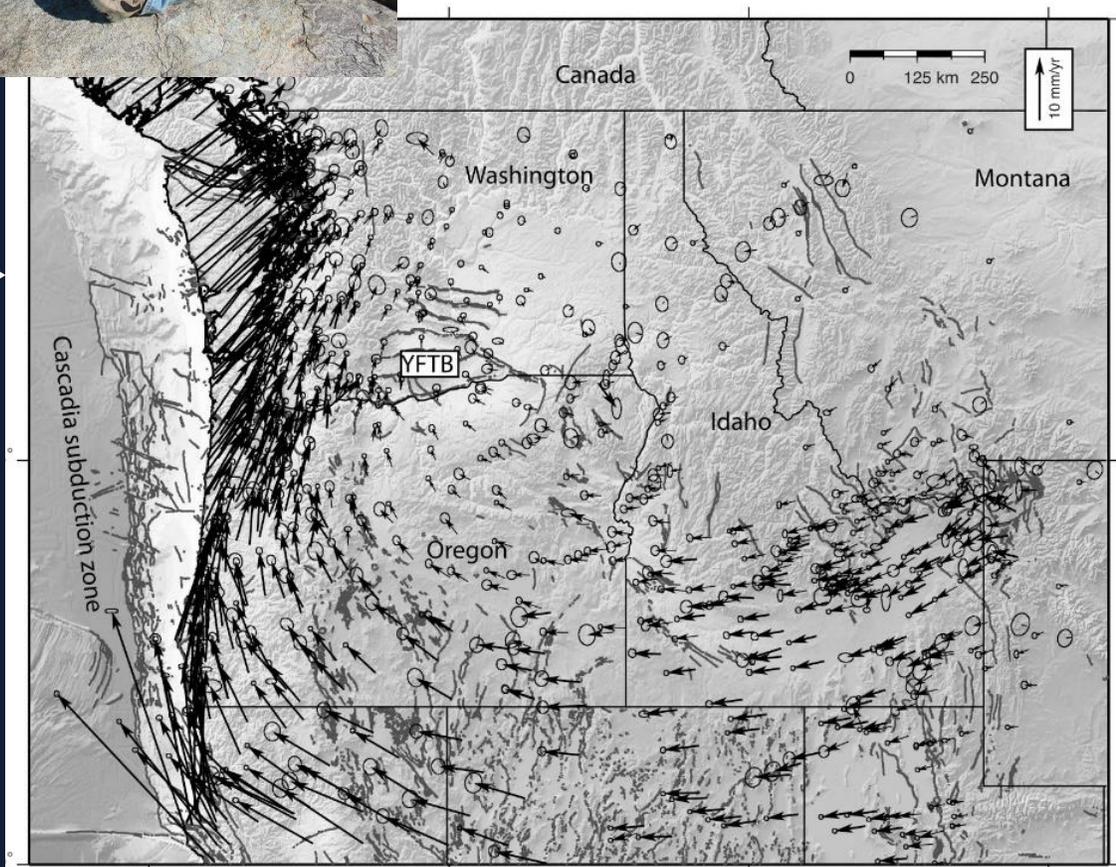


High precision GPS can track movement of Earth's crust

...results in N-S compression in southern and central Washington

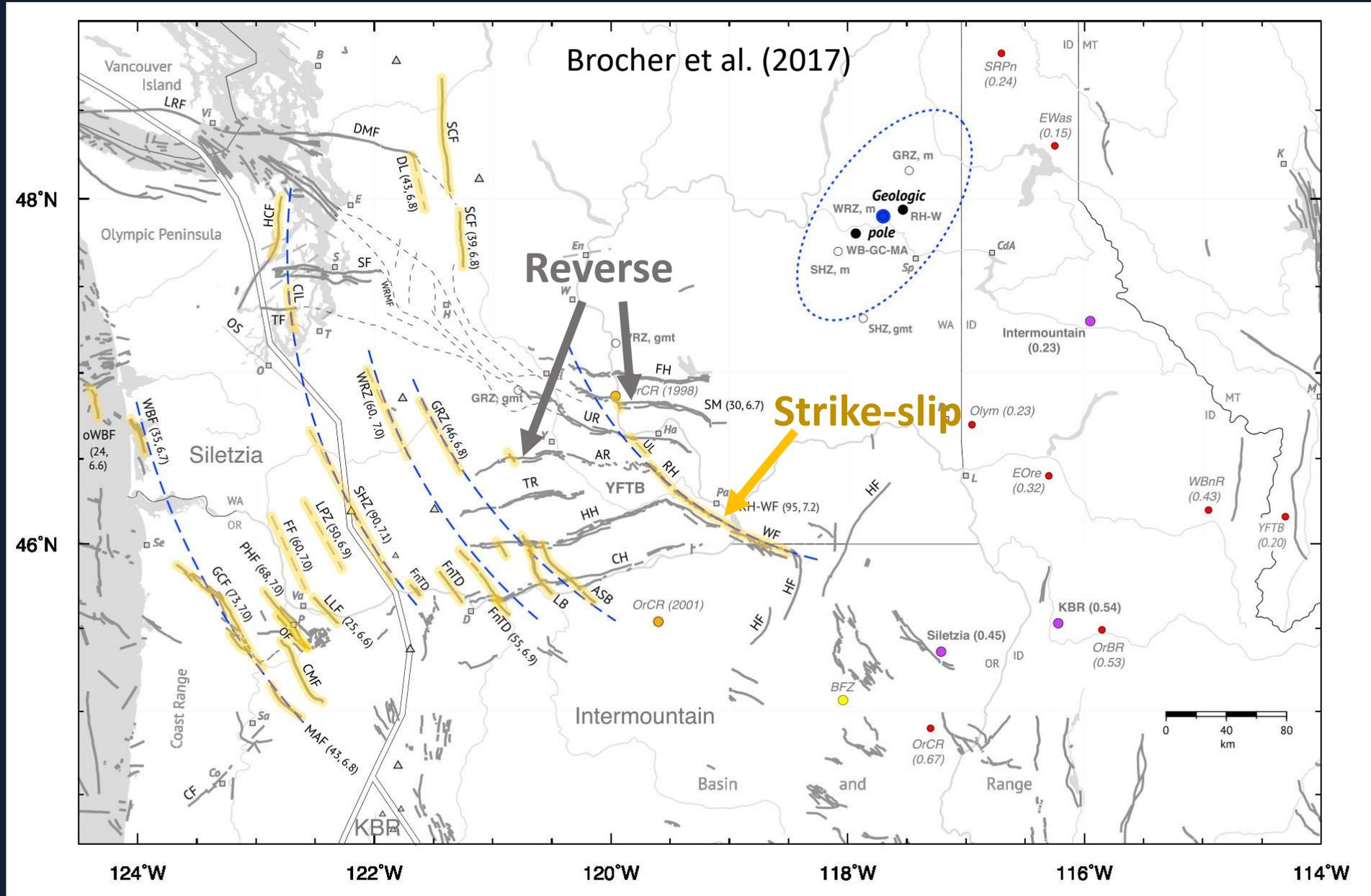


OR/WA rotation documented by GPS...



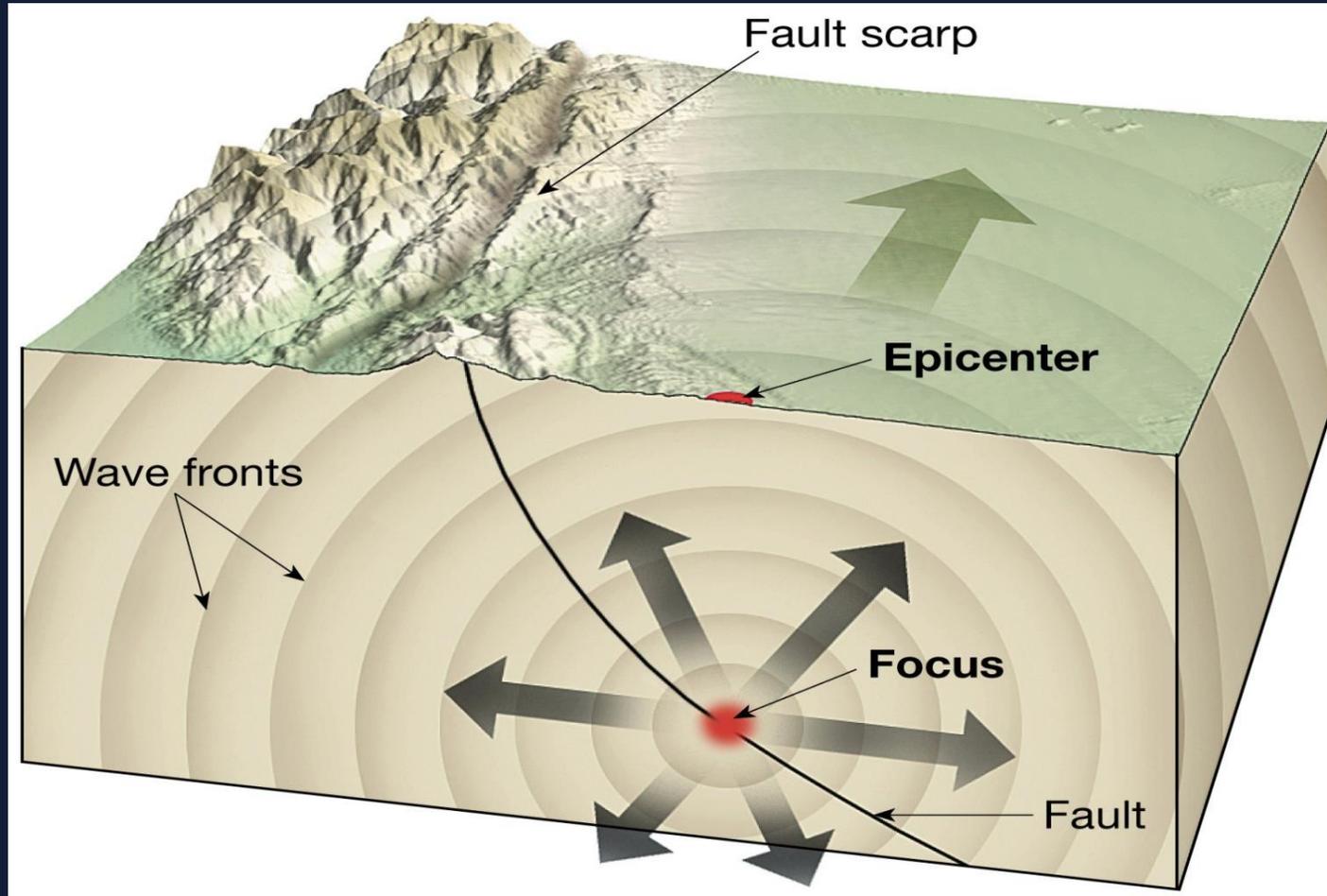
McCaffrey et al. (2016) Wells et al. (1998)

Why *are* there faults in the crust of Washington?



Why are these crustal faults important to us?

Ground shaking from dissipation of energy



Most simply, wave energy (shaking) is proportional to earthquake size and your distance from the earthquake.

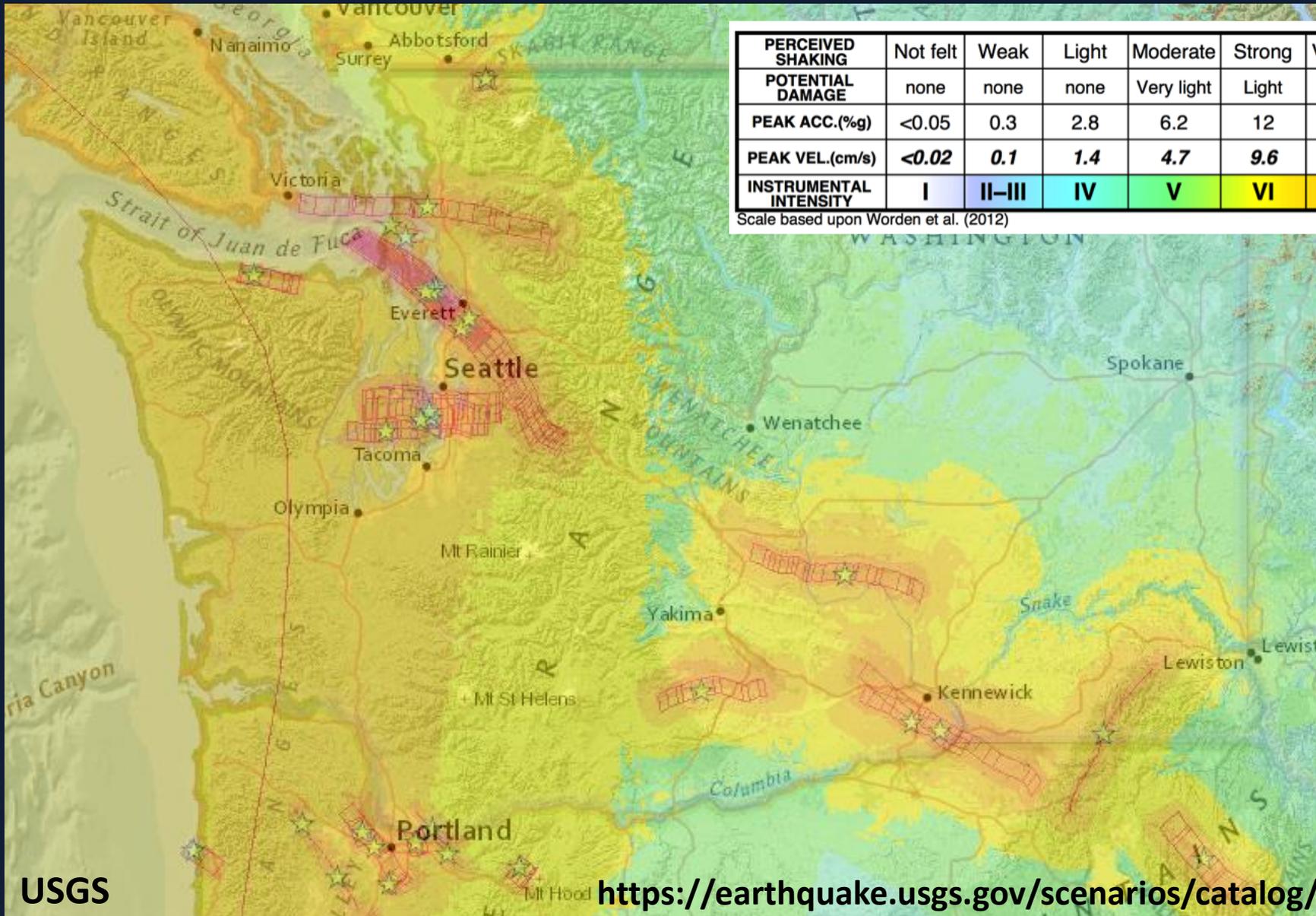


Mercalli Scale: A measure of intensity



Intensity	Shaking	Description
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X+	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Earthquake Scenarios: the highest potential strength of shaking



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

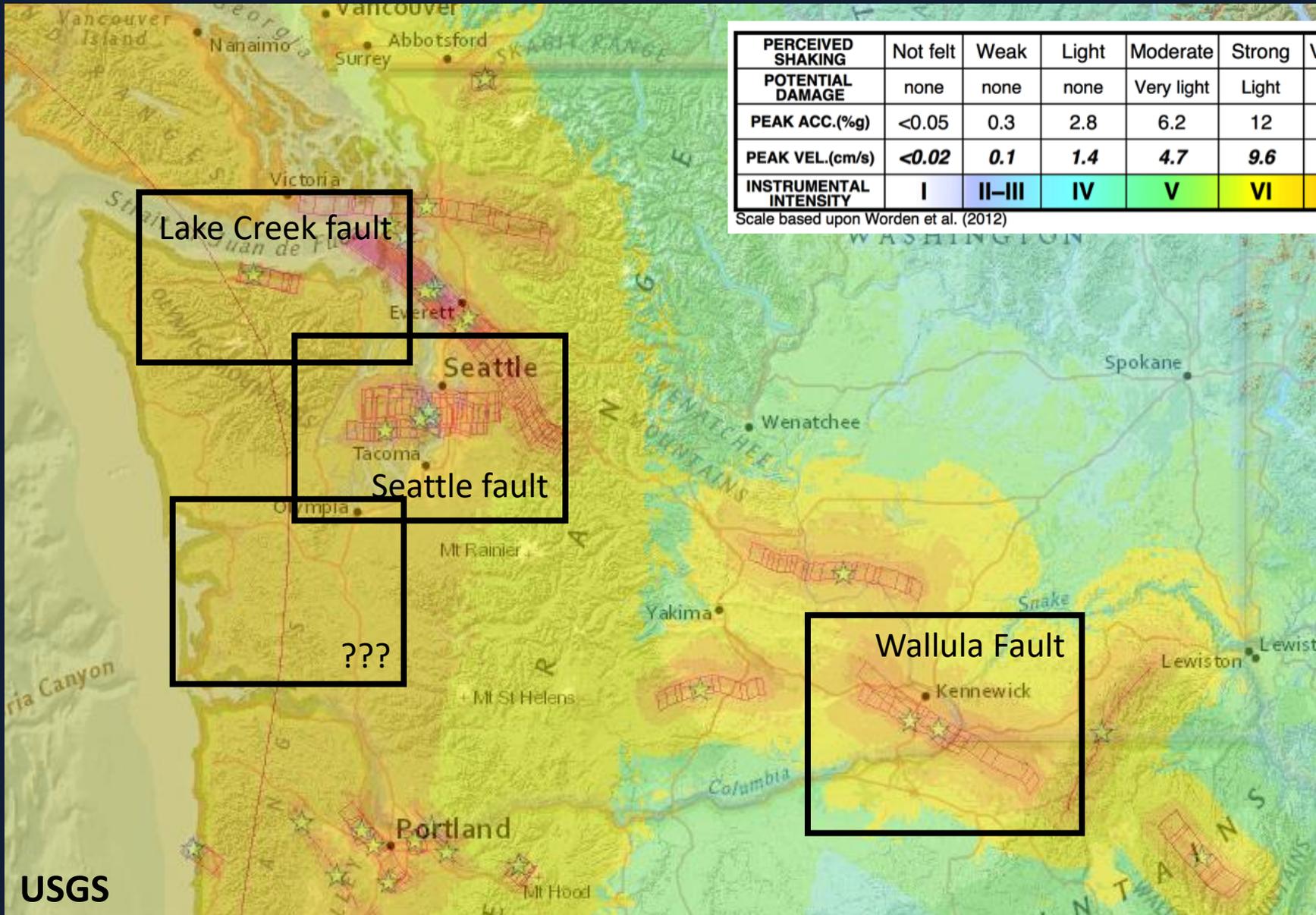
Scale based upon Worden et al. (2012)

What is a “scenario”?
 Fault length (magnitude) + distance = predicted shaking

USGS

<https://earthquake.usgs.gov/scenarios/catalog/>

Earthquake Scenarios: the highest potential strength of shaking

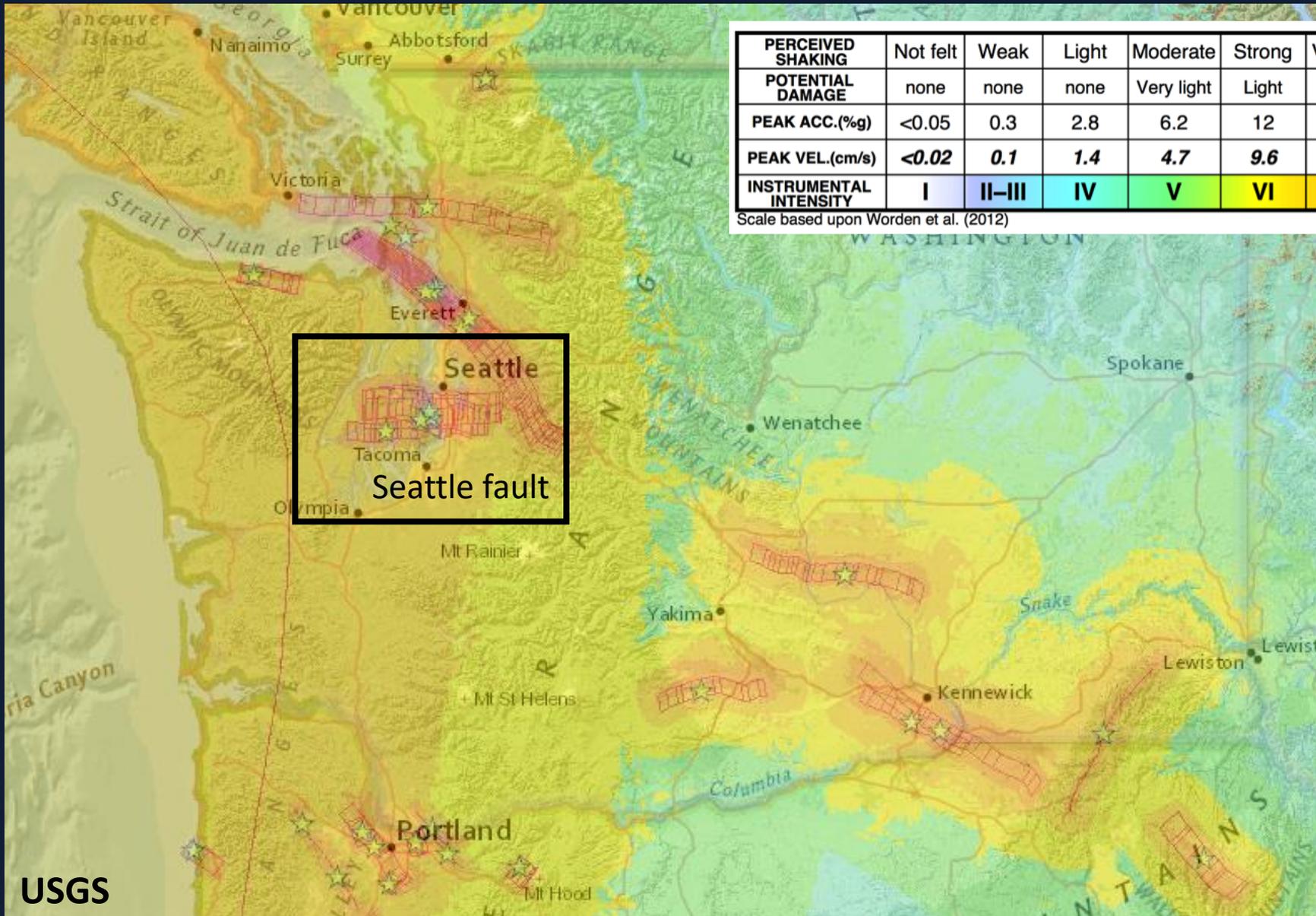


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
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INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

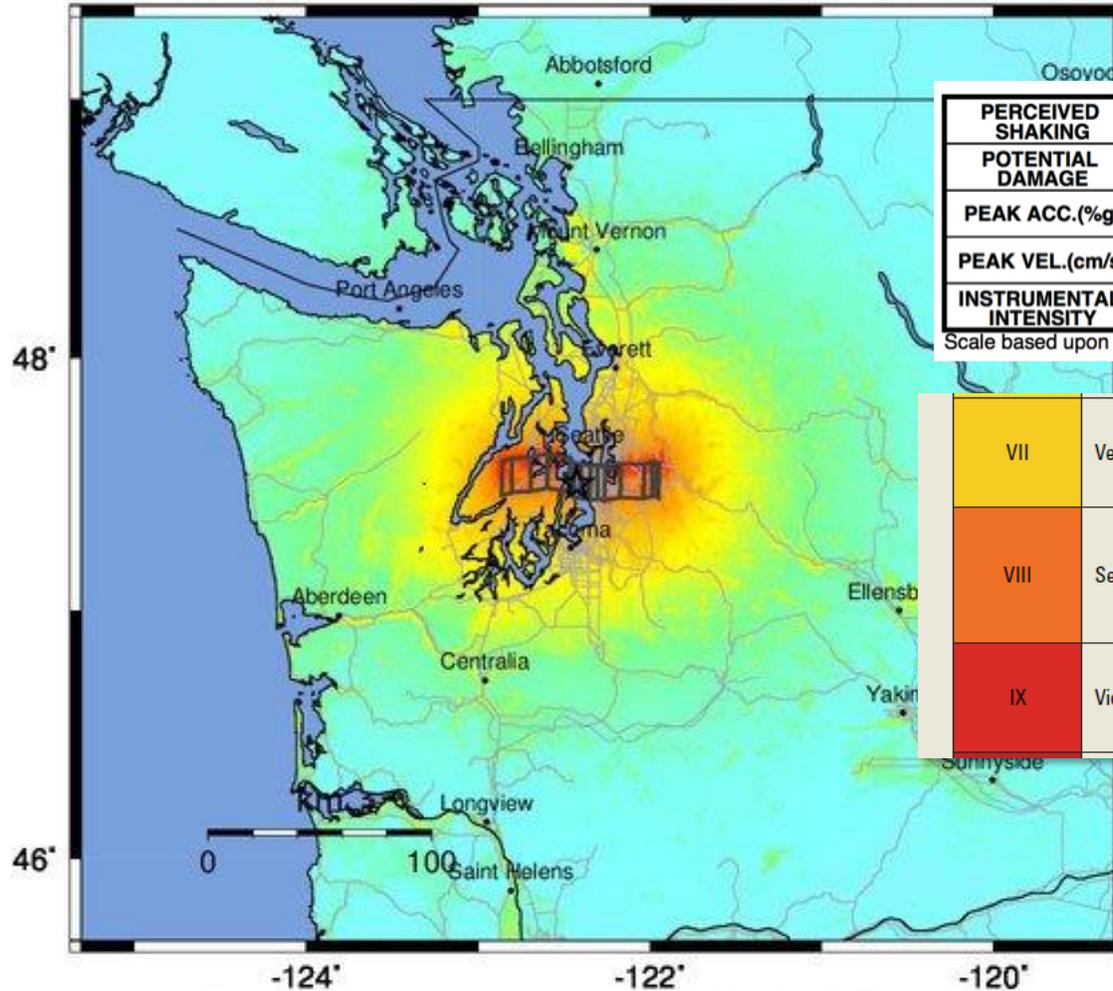
What is a “scenario”?
 Fault length (magnitude) + distance = predicted shaking

Seattle Fault Earthquake Scenario

-- Earthquake Planning Scenario --

ShakeMap for Seattle fault zone-northern - Median ground motions Scenario

Scenario Date: May 12, 2017 02:14:14 PM MDT M 7.2 N47.50 W122.43 Depth: 9.0km



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

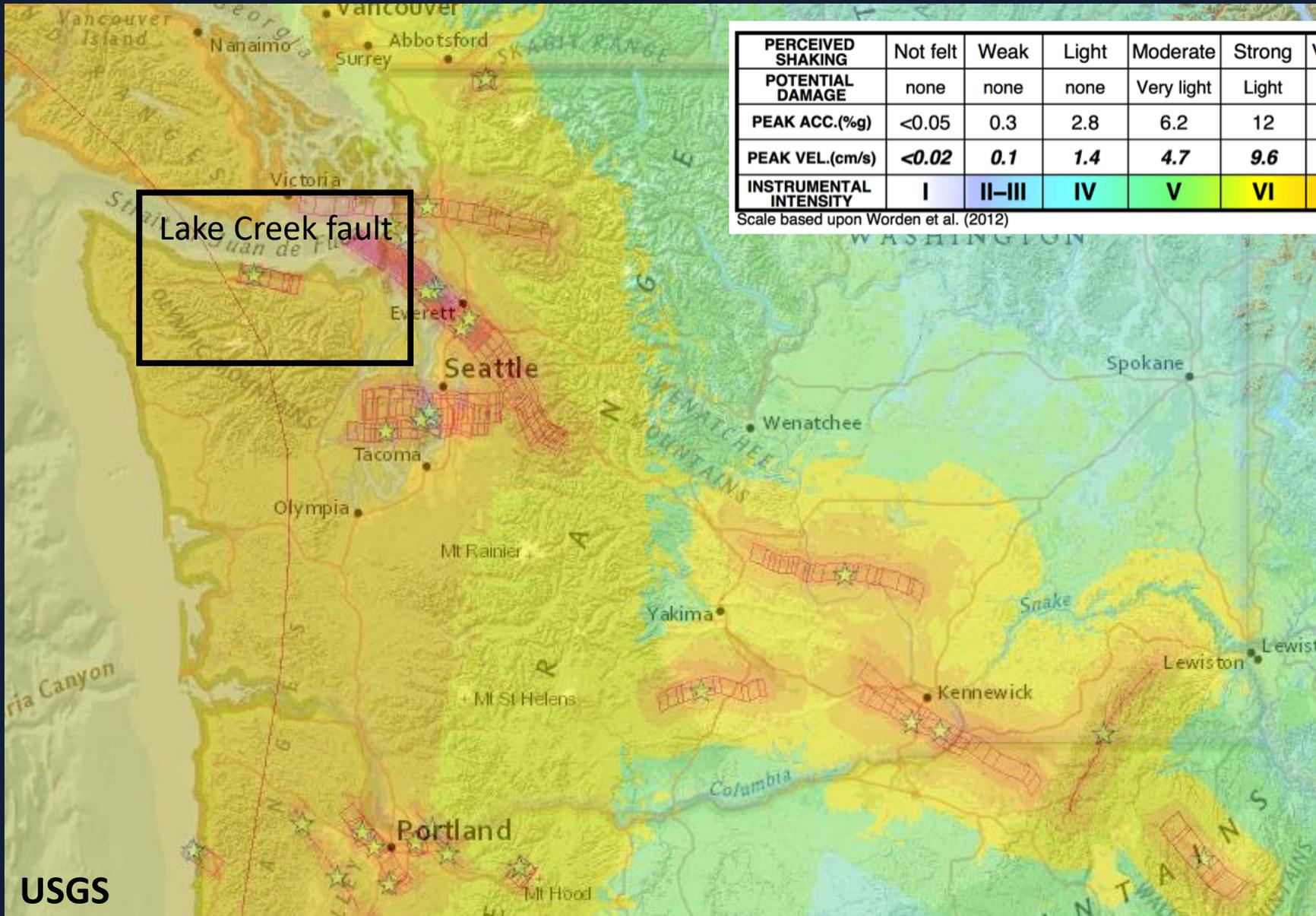
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.

M 7.2: very strong to violent shaking in Seattle

A very similar earthquake happened on this fault ~1000 years ago

PLANNING SCENARIO ONLY -- Map Version 3 Processed 2017-05-15 09:27:50 PM MDT

Earthquake Scenarios: the highest potential strength of shaking

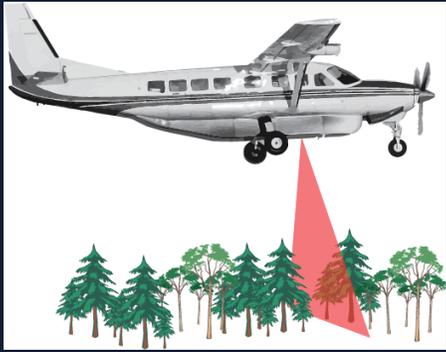


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

What is a “scenario”?
 Fault length (magnitude) + distance = predicted shaking

Lake Creek-Boundary Creek fault on Lidar



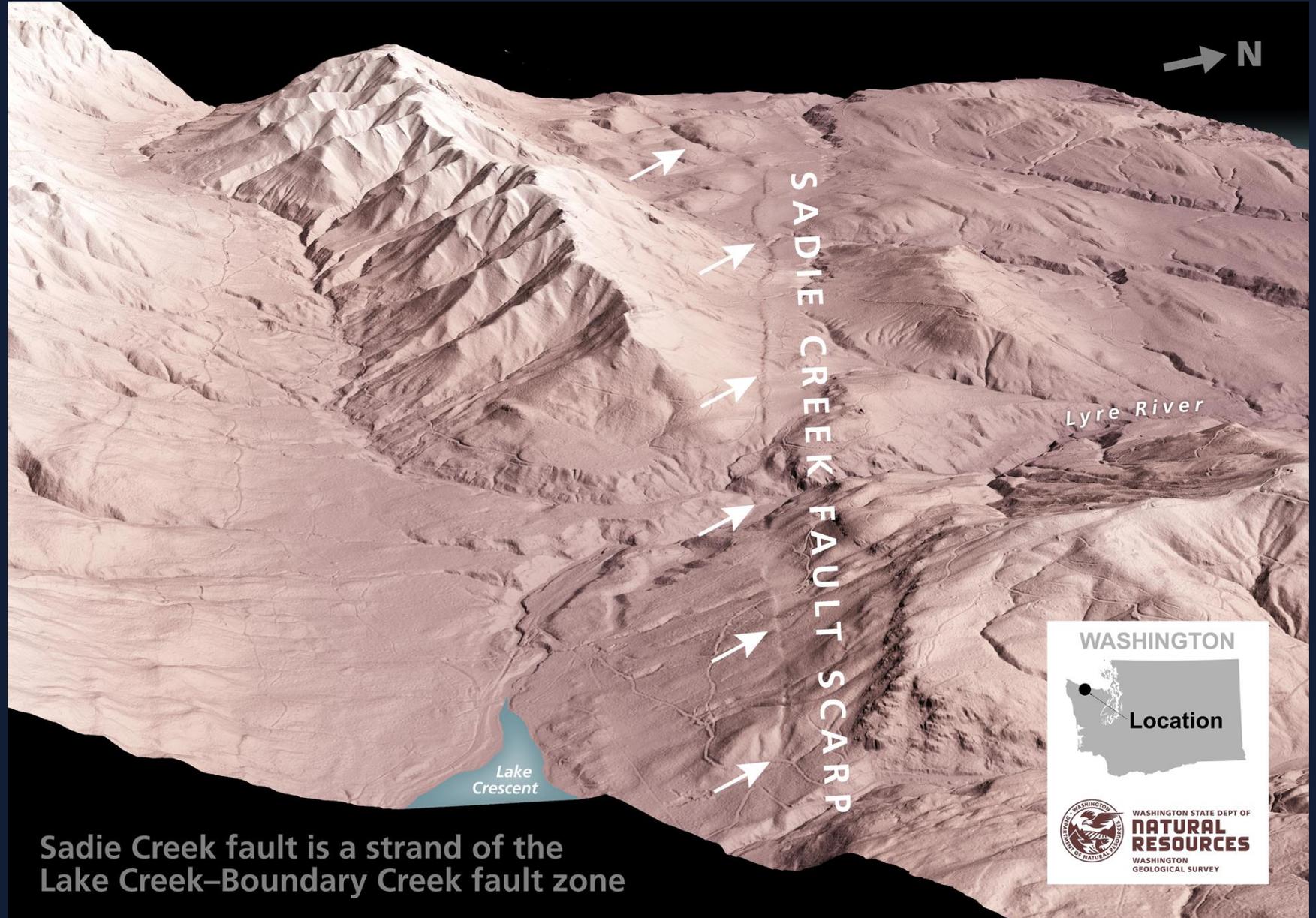
Lidar: Light Detection and Ranging



Lake Creek-Boundary Creek fault on Lidar



Lidar: Light
Detection and
Ranging



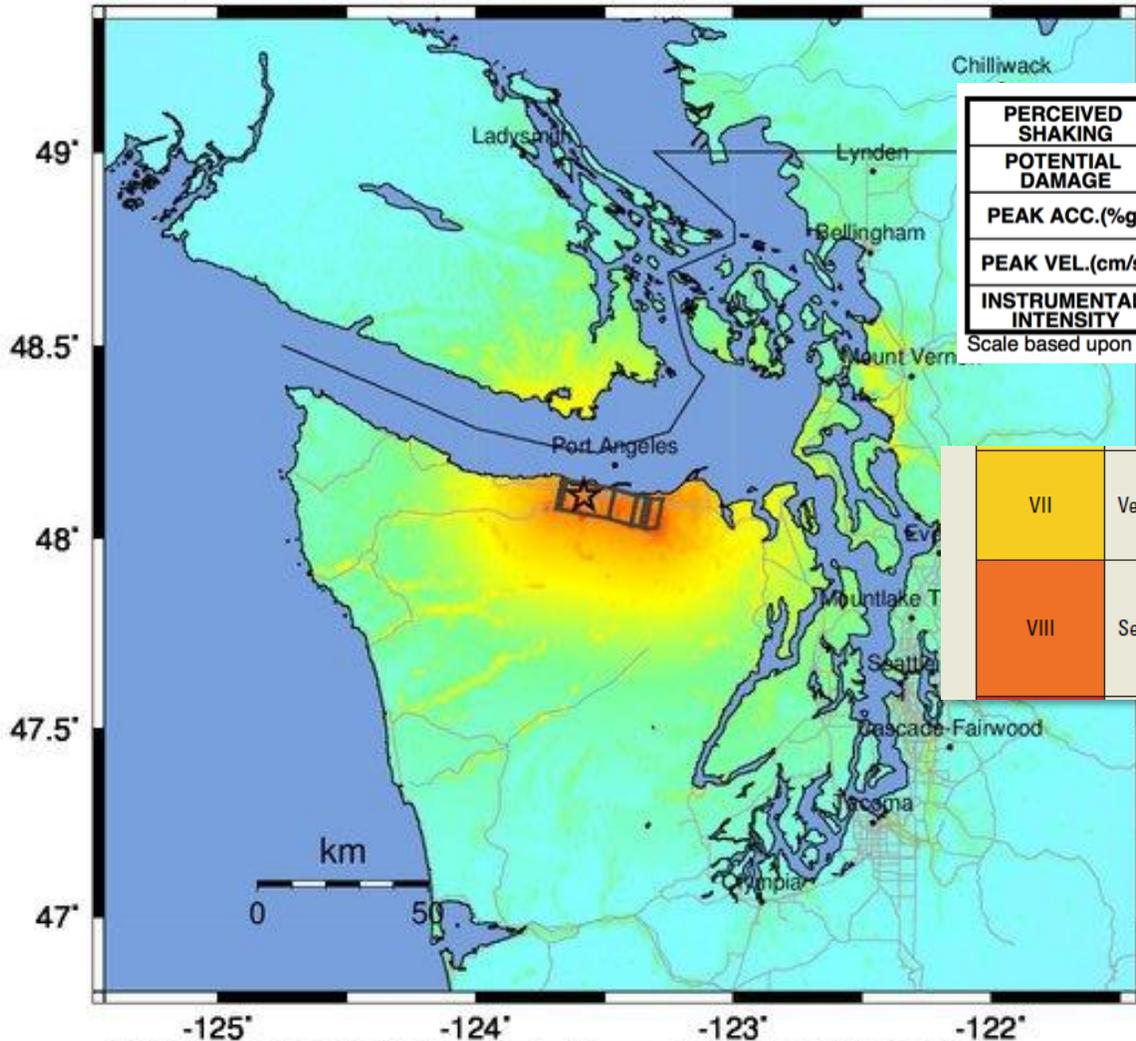
Sadie Creek fault is a strand of the
Lake Creek–Boundary Creek fault zone

Lake Creek-Boundary Creek Earthquake Scenario

-- Earthquake Planning Scenario --

ShakeMap for Lake Creek-Boundary Creek fault - Median ground motions Scenario

Scenario Date: May 12, 2017 02:14:08 PM MDT M 6.8 N48.11 W123.58 Depth: 9.0km



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

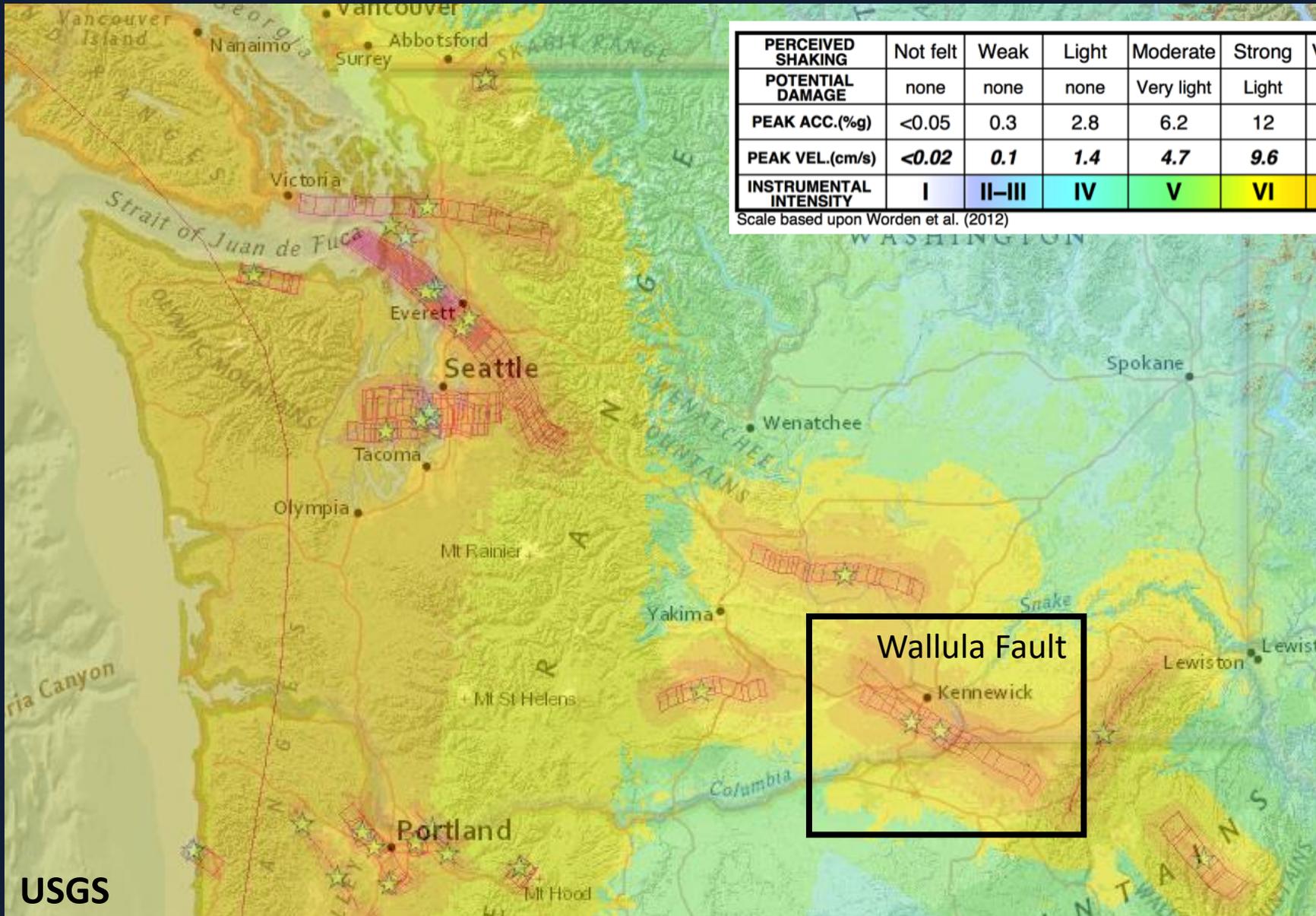
Scale based upon Worden et al. (2012)

VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

M 6.8: very strong to severe shaking in Port Angeles

Current research from Western Washington U. suggests the fault is longer than shown here

Earthquake Scenarios: the highest potential strength of shaking



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
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INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

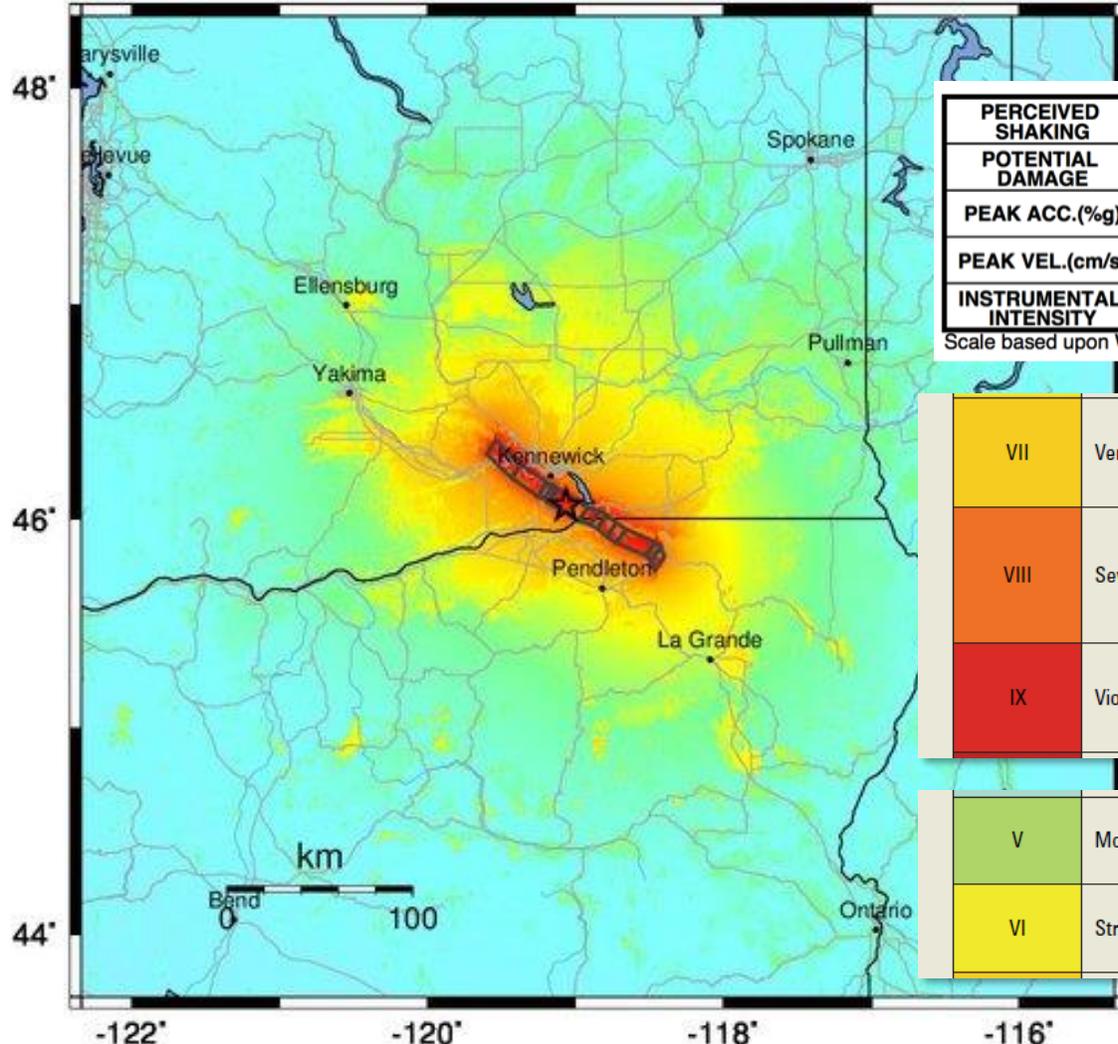
What is a “scenario”?
 Fault length (magnitude) + distance = predicted shaking

Wallula Fault Earthquake Scenario

-- Earthquake Planning Scenario --

ShakeMap for Rattlesnake-Wallula fault system - Median ground motions Scenario

Scenario Date: May 12, 2017 02:14:08 PM MDT M 7.4 N46.06 W119.07 Depth: 9.0km



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
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IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.

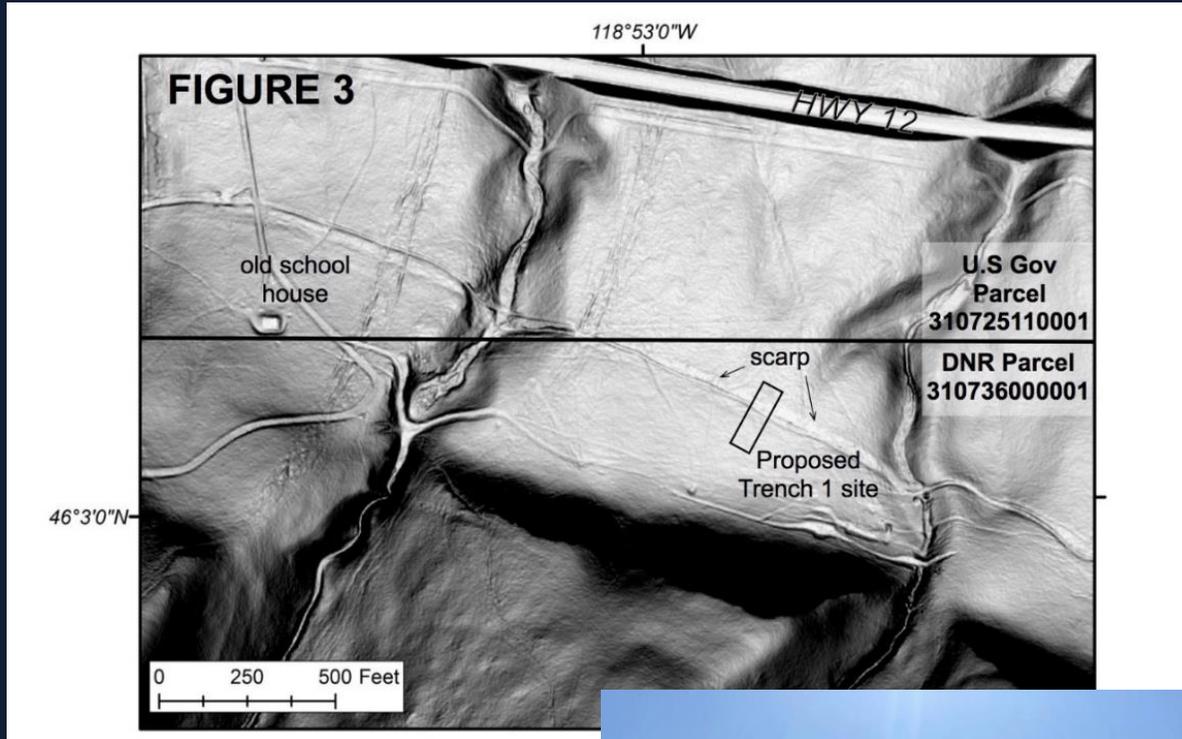
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

M 7.4: very strong to violent shaking in Richland/Kennewick

...but 1936 ~ M 5.9: Moderate to strong shaking

How often should we expect earthquakes?

Example: Work being done on the Wallula fault

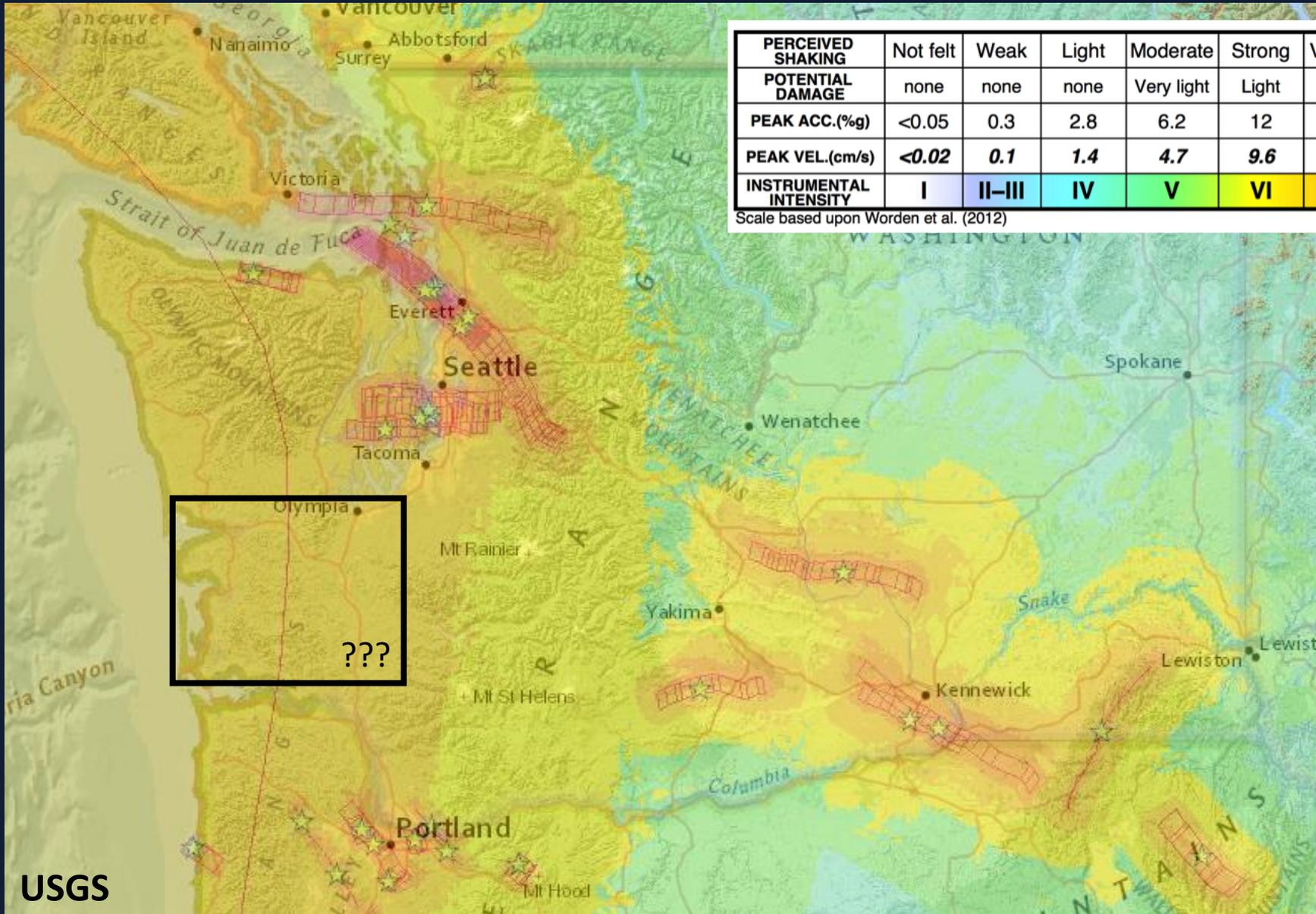


LiDAR: high resolution topography

This is what was happening last year and again this summer



Earthquake Scenarios: the highest potential strength of shaking

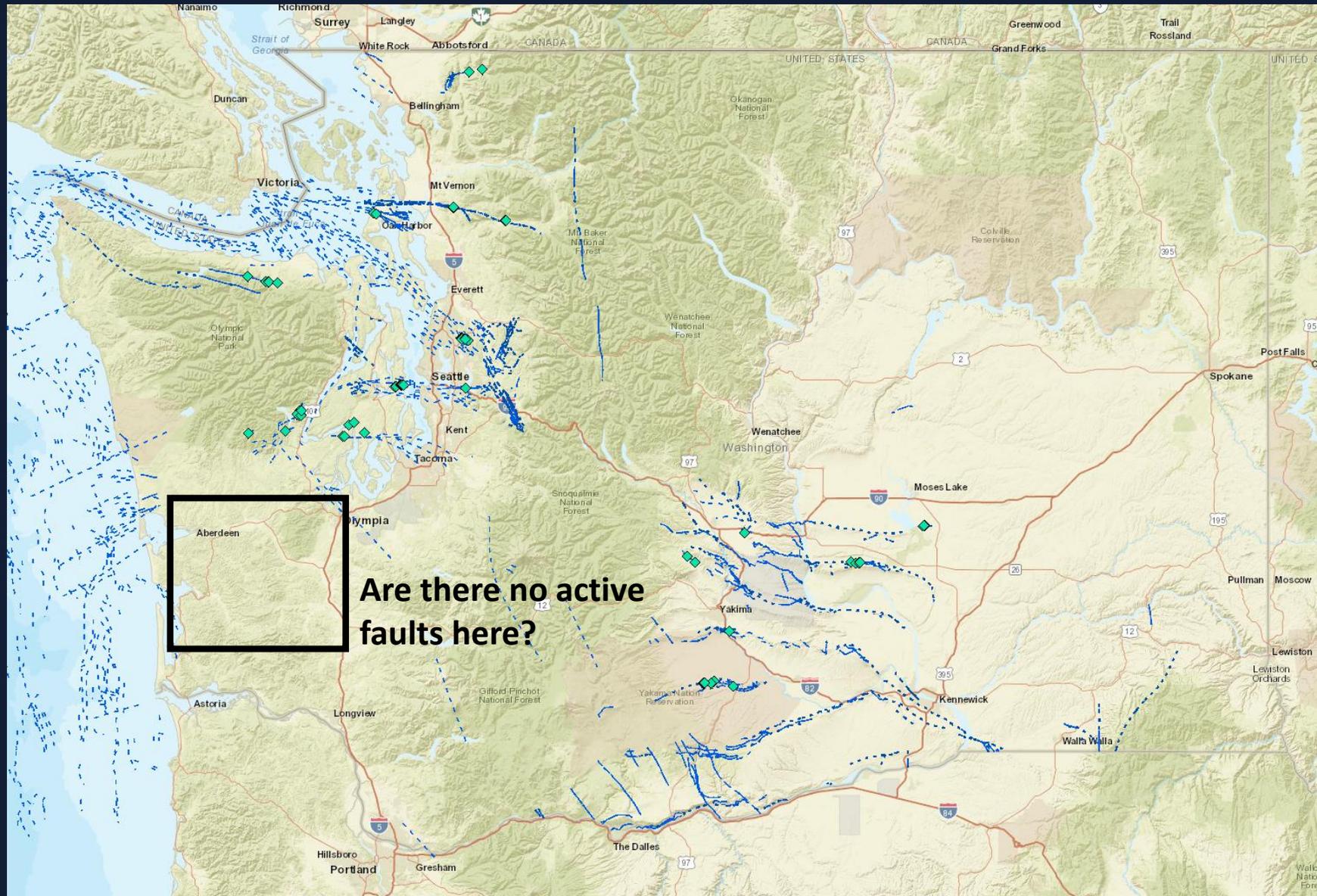


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
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PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

What is a “scenario”?
 Fault length (magnitude) + distance = predicted shaking

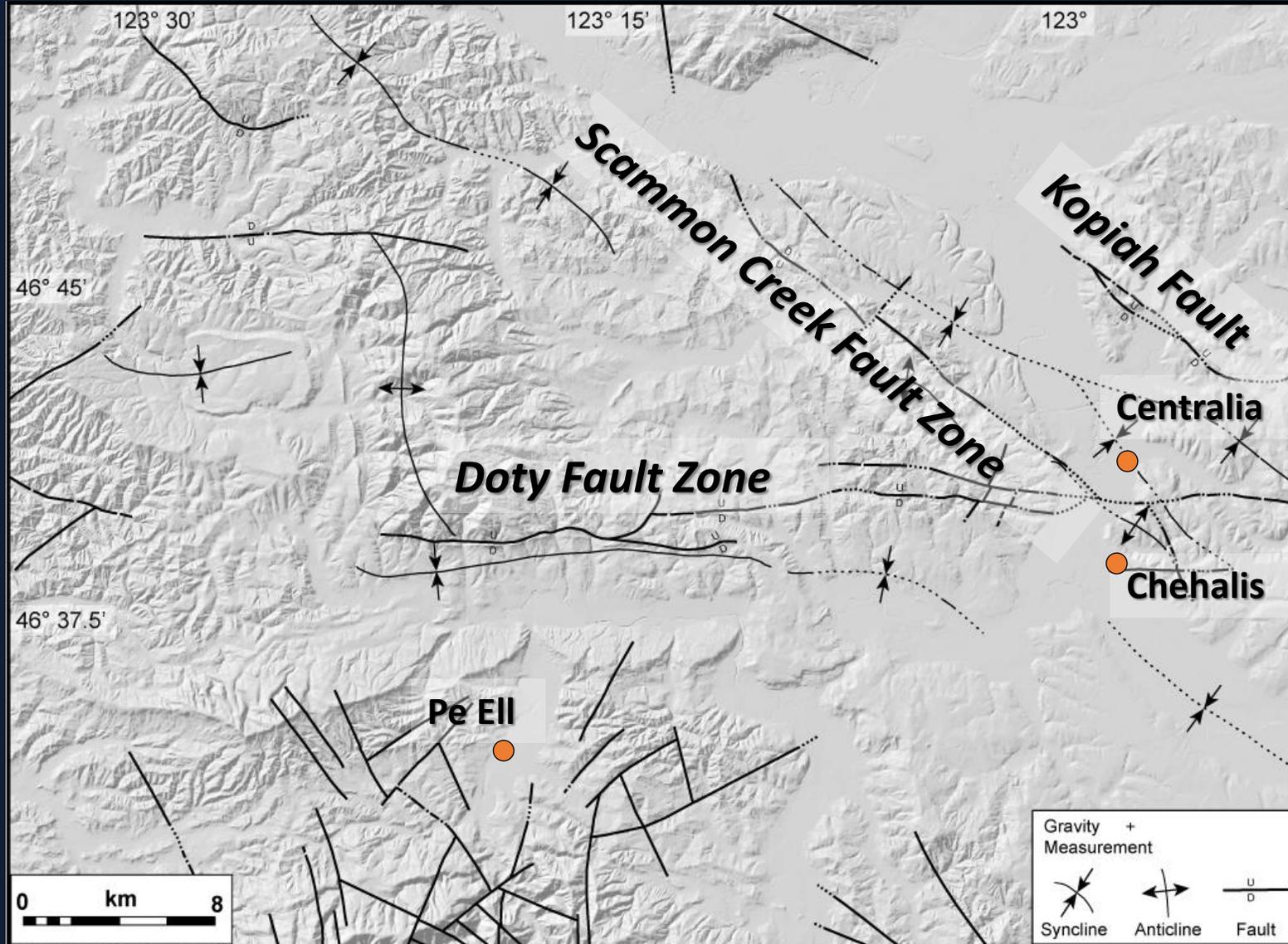
We also don't know where all the faults are or if they are active



The Doty fault

Where, exactly do these faults go?

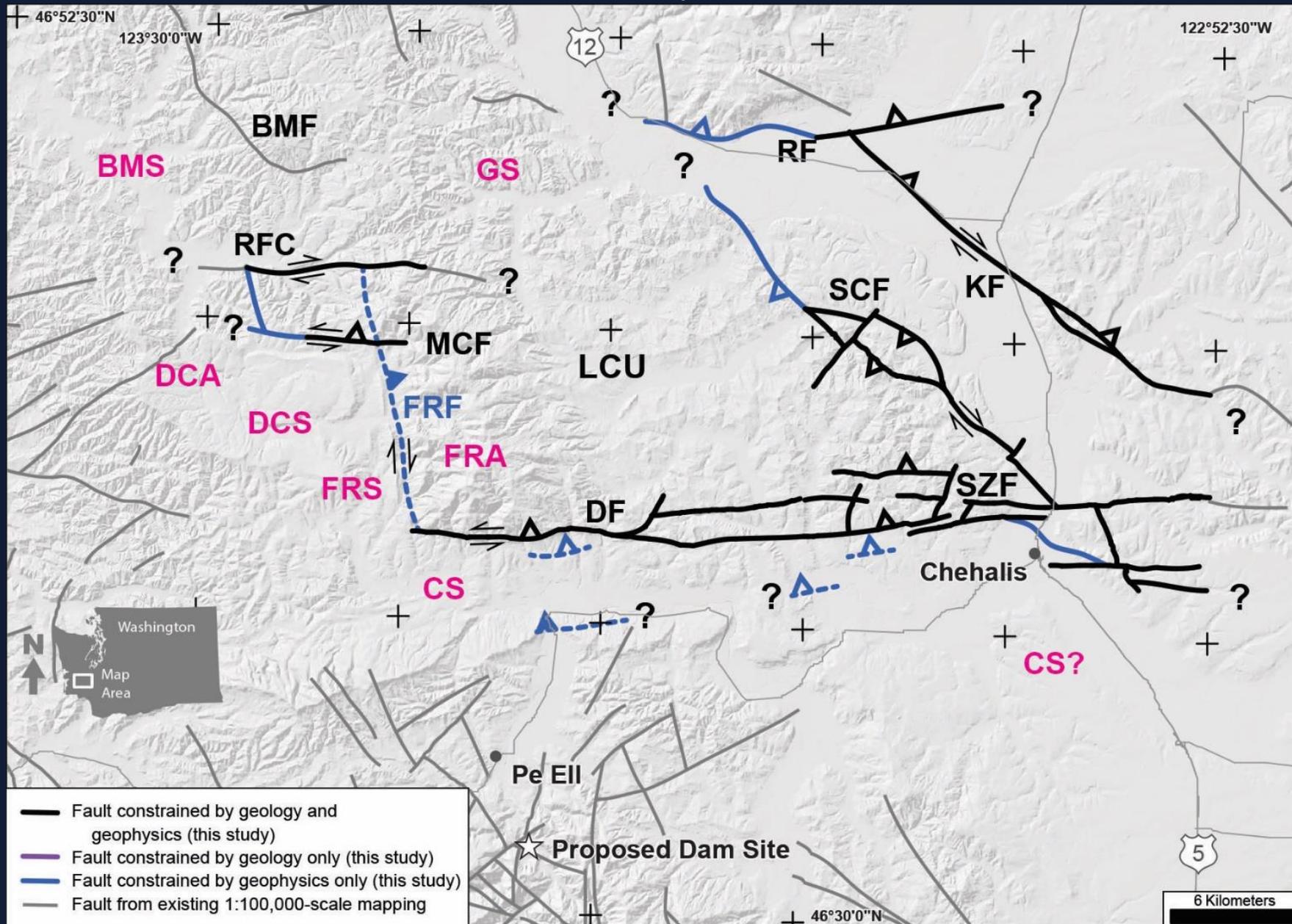
How long are they?



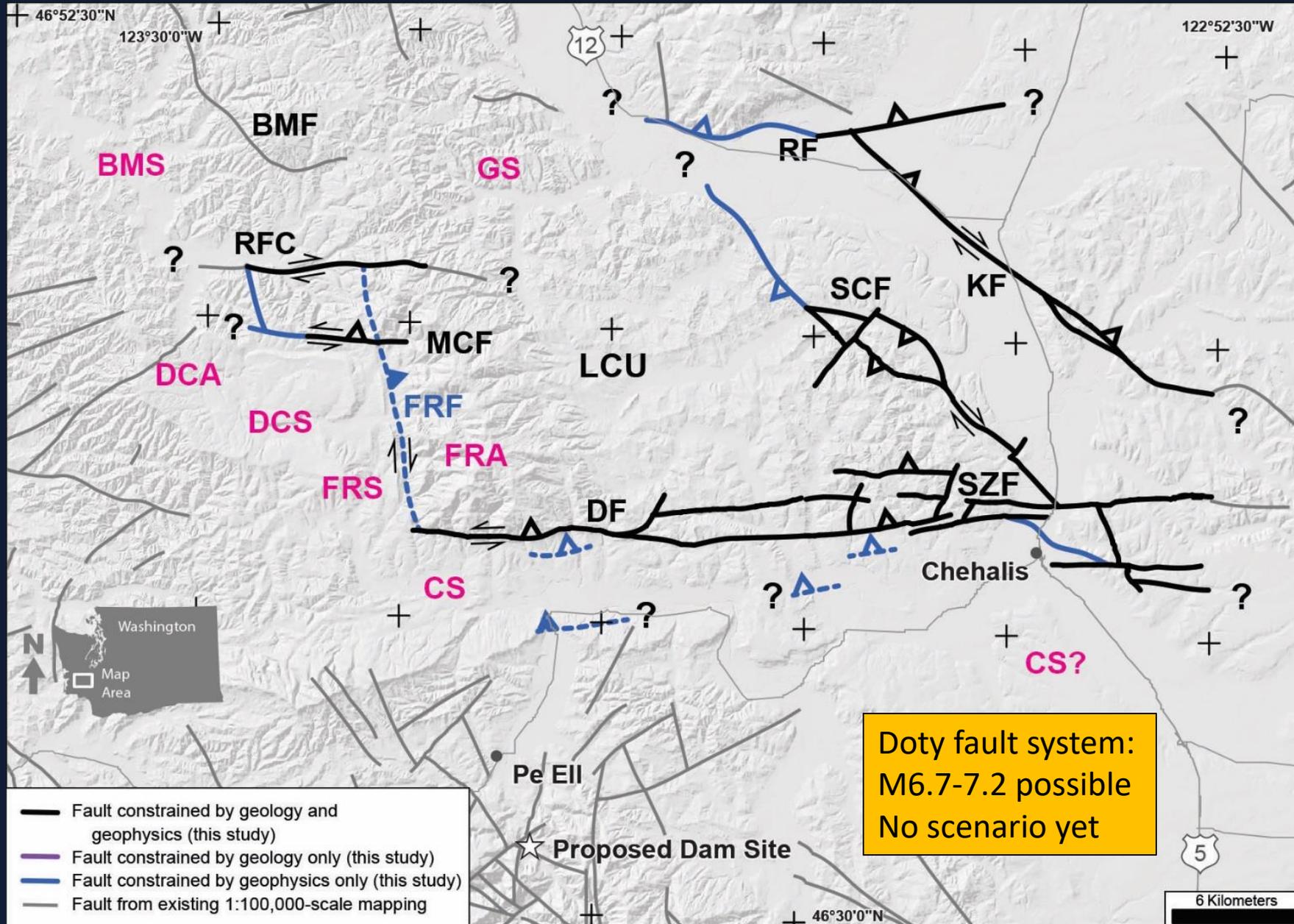
Are these the only faults?

How big an earthquake is possible?

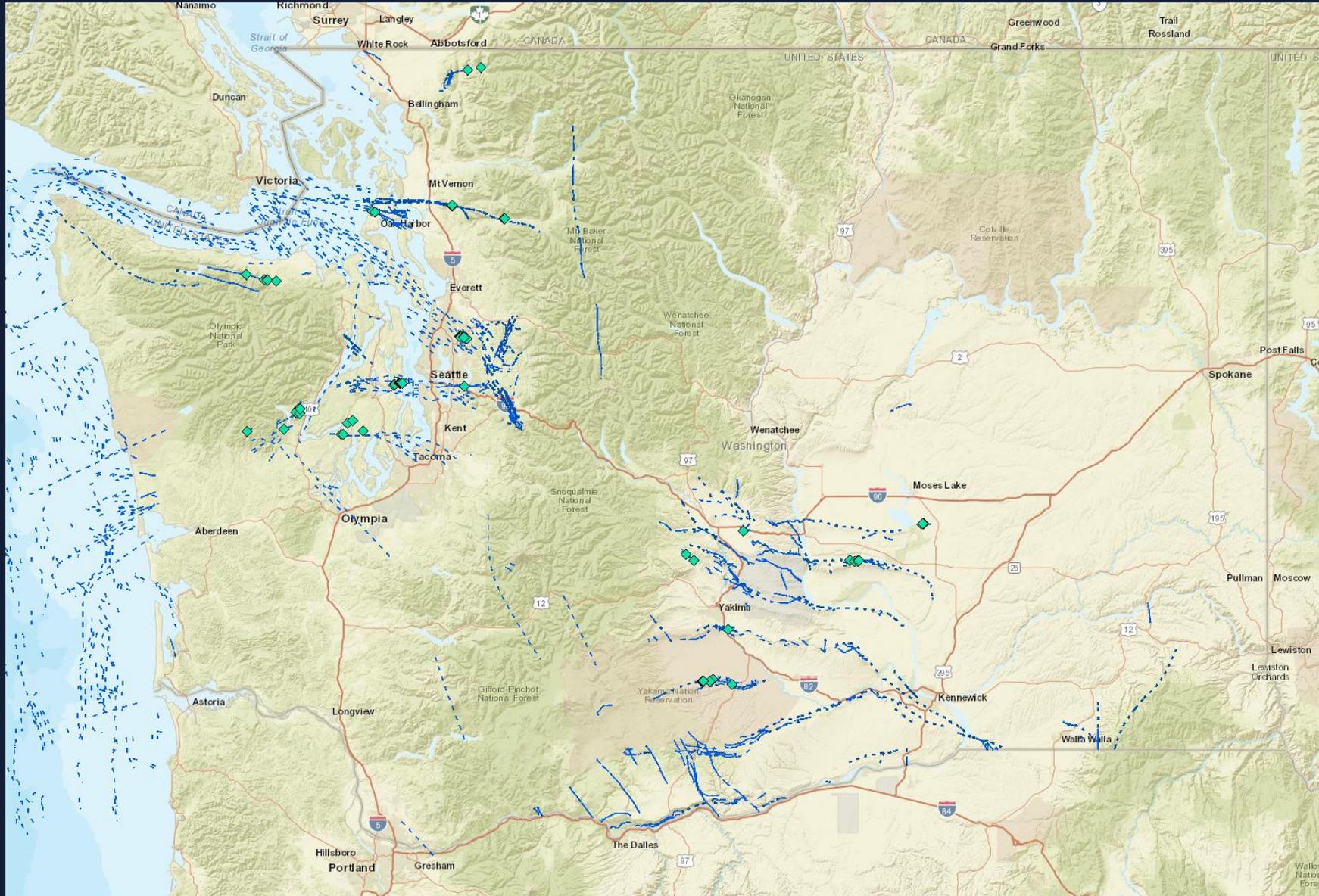
The Doty fault



The Doty fault



There's still a lot of work to do before we fully understand earthquake hazard in WA



But you can find relevant information now <https://www.dnr.wa.gov/geology>

WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES
HILARY S. FRANZ | COMMISSIONER OF PUBLIC LANDS

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Washington Geological Survey
360-902-1450

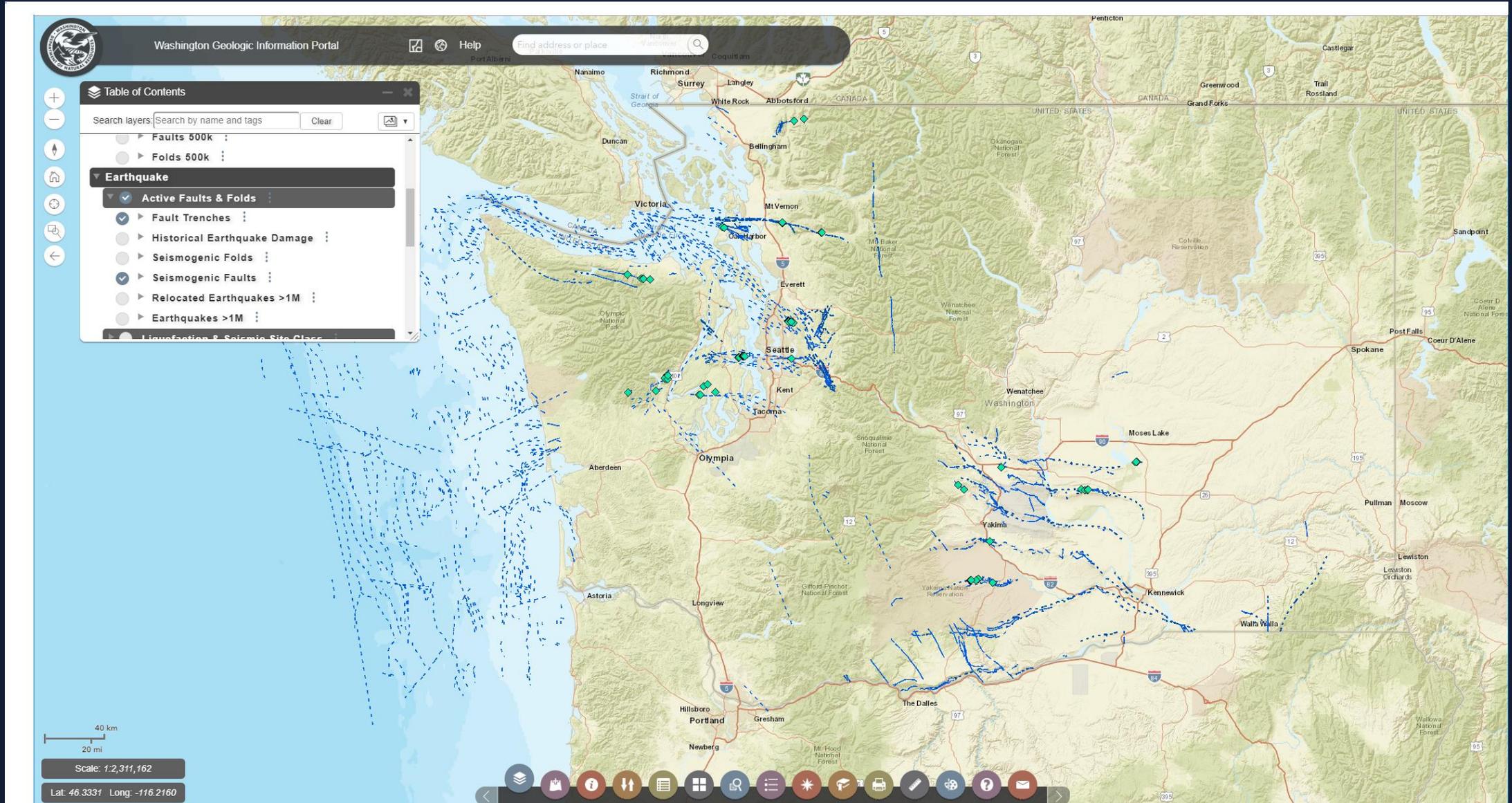
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Find scenarios, fault locations and other hazards information



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Landslides

Volcanoes and Lahars

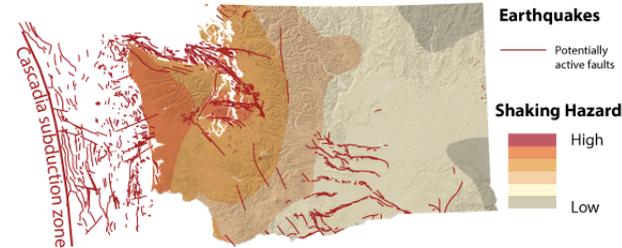
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Emergency Preparedness

Earthquakes and Faults



This map shows areas of seismic risk from high (red) to low (grayish-green) and is from a 2007 report on the seismic design categories in Washington. Clicking on the map will download the publication.

Earthquakes occur nearly every day in Washington. Most are too small to be felt or cause damage. Large earthquakes are less common but can cause significant damage to the things we count on in everyday life, such as buildings, roads, bridges, dams.

[Read more]

- ▶ **WHAT WE DO**
- ▶ **WHAT TO DO BEFORE, DURING, AND AFTER AN EARTHQUAKE**
- ▶ **ACTIVE FAULTS AND FUTURE EARTHQUAKES**
- ▶ **WHAT ARE FAULTS AND EARTHQUAKES?**
- ▶ **HOW EARTHQUAKES CAUSE DAMAGE**
- ▶ **HISTORIC EARTHQUAKES IN WASHINGTON**

CONTACT US

Geologic Hazards Group
Corina Forson
Chief Hazards Geologist
360-902-1455
email

PUBLICATIONS



Cascadia subduction zone earthquakes
—A magnitude 9.0 earthquake scenario

LINKS

For more information about earthquakes, faults, and emergency preparation, consider visiting the following sites:

- [Washington Emergency Management](#)
Information on preparation for emergencies and disasters in our state
- [Cascadia Region Earthquake Workgroup](#)
Improving the ability of emergency responders

WHAT TO EXPECT WHEN YOU'RE EXPECTING

an
EARTHQUAKE



Washington is earthquake country, but what does that mean for you? Join this FREE webinar to learn about earthquake hazards in Washington and what to do before, during, and after an earthquake.

September 23
1:00pm - 2:30pm (PST)

Webinar Link:
<http://bit.ly/earthquake2020>

Captions available. Questions?
Email shakeout@mil.wa.gov

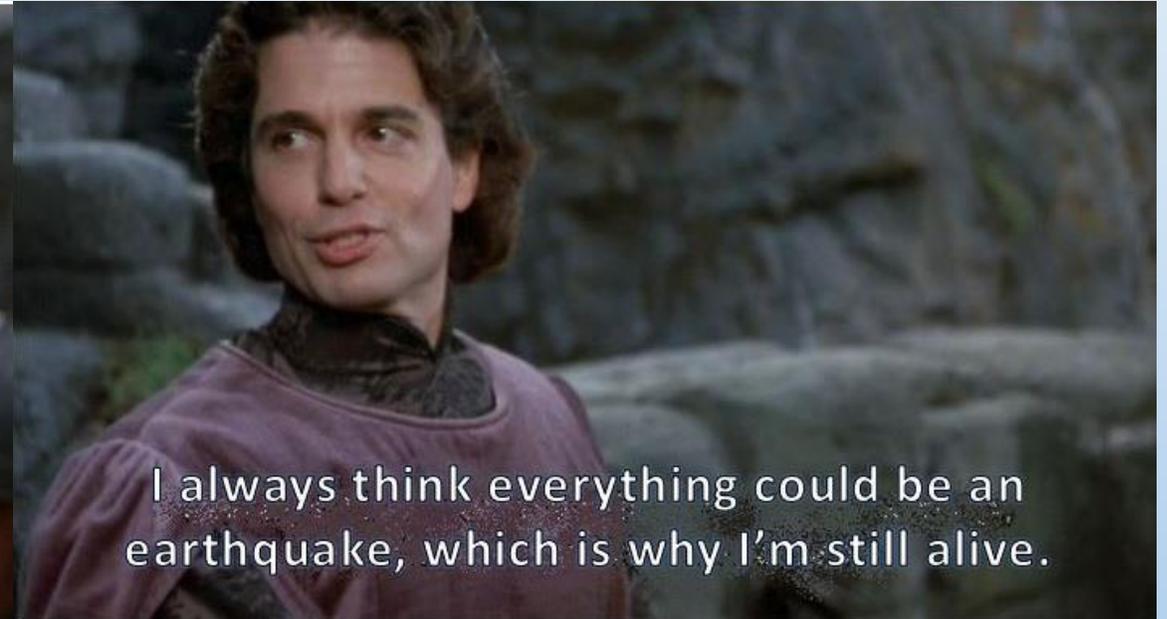




EMERGENCY MANAGEMENT DIVISION

"A disaster-ready and resilient Washington State"

What to expect when you're expecting an earthquake



Brian Terbush

Earthquake/Volcano Program Coordinator



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"A disaster-ready and resilient Washington State"





When an Earthquake Strikes:

Where Will You Be? What Will You Do?

Drop, Cover, and Hold on. Washington is earthquake country. It's not a question of "if" but "when" an earthquake will strike us. Be sure to practice your earthquake skills on the third Thursday of each October during the Great Washington ShakeOut. More information at shakeout.org/Washington.

INDOORS

Drop onto your hands and knees, Cover your head and neck, and Hold on under something sturdy until shaking stops. If no shelter is nearby, crawl next to an interior wall (away from windows). Do not go outside during shaking! One of the most dangerous places to be is near an exterior wall of a building.

IN A CLASSROOM

Drop, Cover, and Hold on. Keep in mind that laboratories and other settings may require special safety considerations.

IN A WHEELCHAIR/ WITH A WALKER

Lock your wheels, Cover your head and neck, and Hold on until the shaking stops.

IN A HIGH-RISE

Drop, Cover, and Hold on. Once the shaking stops, if you evacuate the building, use stairs instead of elevators.

IN BED

Lie face down, Cover your head and neck with a pillow, and Hold on with both hands.

IN A STORE

Drop away from shelves, Cover next to a shopping cart or beneath clothing racks if possible, and Hold on.

OUTDOORS

Move to a clear area if you can safely do so (away from buildings, power lines, trees, signs, vehicles, and other hazards), then Drop, Cover, and Hold on.

DRIVING

Pull over, stop, and set the parking brake — avoid overpasses, bridges, power lines, and other hazards. Stay inside the vehicle until shaking stops.

NEAR A SHORELINE

As soon as shaking reduces such that you are able to stand, walk quickly to high ground or inland.

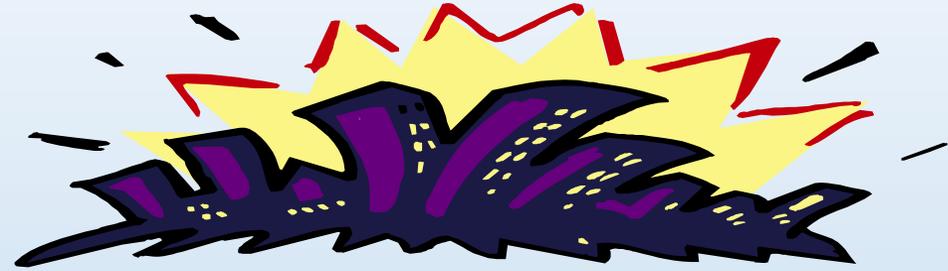


Animated version at:
[Youtube.com/EMDprepare/videos](https://www.youtube.com/EMDprepare/videos)





What to Expect



- Earthquakes strike suddenly, sometimes with a roar
- Everything will begin to shake
- Lights will flicker or go out
- Sprinklers and fire alarms may activate
- Windows may shatter
- Objects will fly off shelves and walls, furniture will move
- People may be screaming
- Trees and telephone poles will rock side to side, some may fall over
- "Paint can was stirring itself!"



Do not try to run!



Most injuries are caused by:

- Falling while moving during shaking
- Being struck by falling objects





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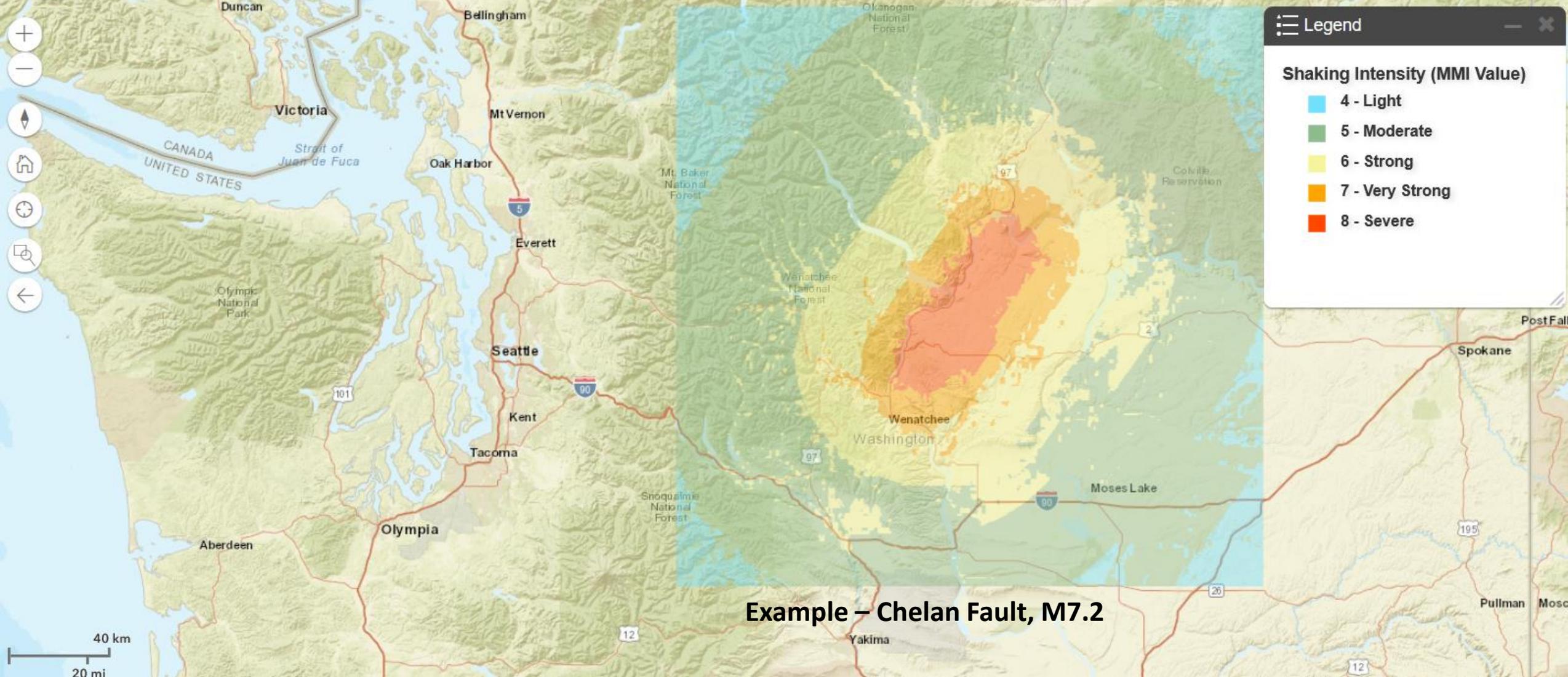


Washington Geologic Information Portal



Help

Find address or place

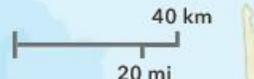


Legend

Shaking Intensity (MMI Value)

- 4 - Light
- 5 - Moderate
- 6 - Strong
- 7 - Very Strong
- 8 - Severe

Example – Chelan Fault, M7.2





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Washington Geologic Information Portal



Help

Find address or place



Legend

Shaking Intensity (MMI Value)

- 5 - Moderate
- 6 - Strong
- 7 - Very Strong
- 8 - Severe



6 mi

Cashmere

Leavenworth

Chelan

Bridgeport

Brewster

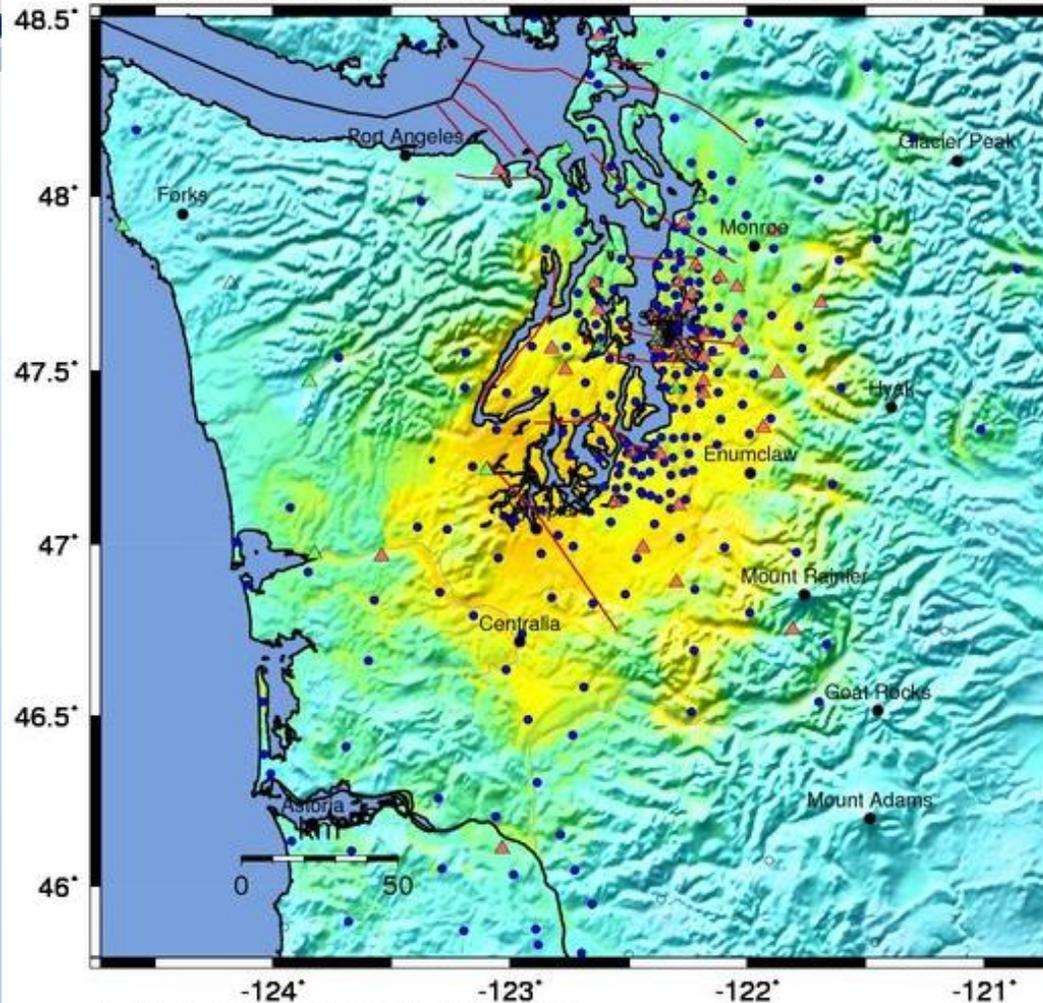


EMERGENCY MANAGEMENT DIVISION

"A disaster-ready..."

PNSN ShakeMap : 16.9 km (10.5 mi) NE of Olympia, WA

Feb 28, 2001 10:54:32 AM PST M 6.8 N47.15 W122.73 Depth: 51.9km ID:10530748



Map Version 1 Processed 2019-01-27 04:35:18 PM PST

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

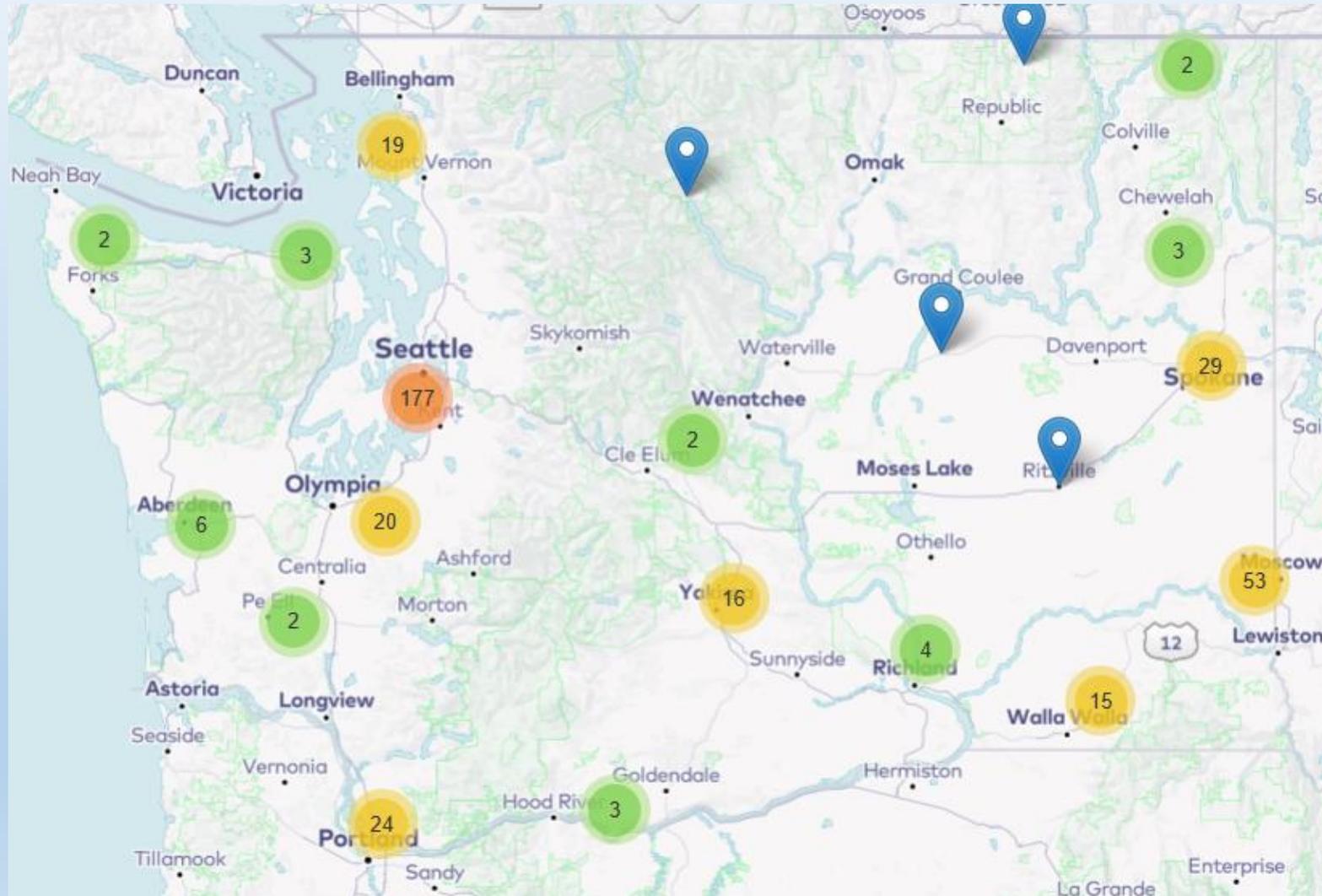
Scale based upon Worden et al. (2012)



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Unreinforced Masonry **School** Buildings – WA DES project



<https://www.commerce.wa.gov/about-us/research-services/unreinforced-masonry-building-inventory/>



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It could save your life! - Mexico City 1985



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Effects - Shaking





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Effects - Liquefaction





EMERGENCY MANAGEMENT DIVISION

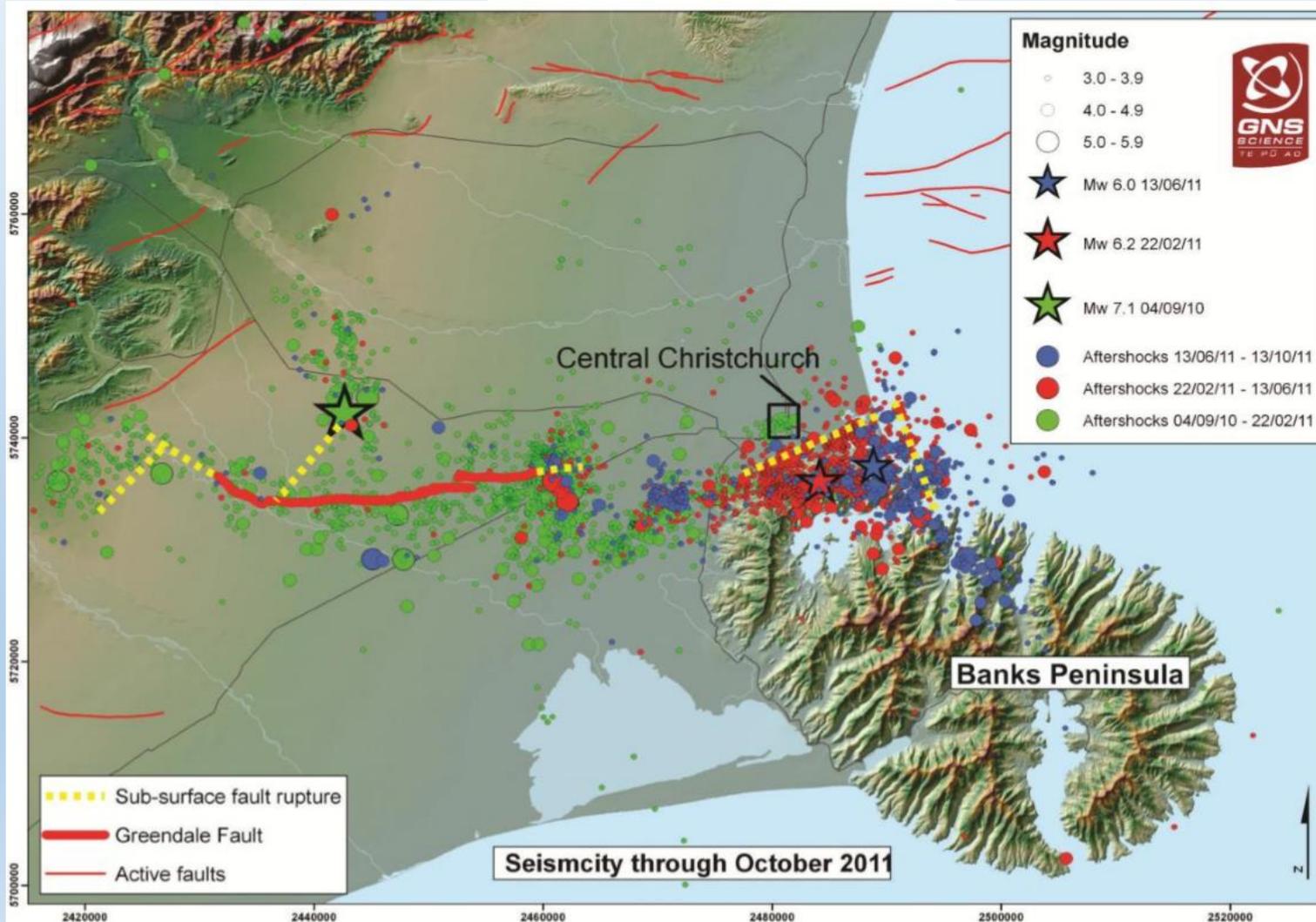
"A disaster-ready and resilient Washington State"

Effects - Fire



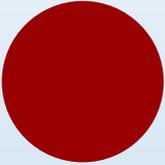
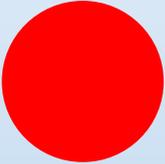


Aftershocks - Christchurch, New Zealand 2010-2011





Legend

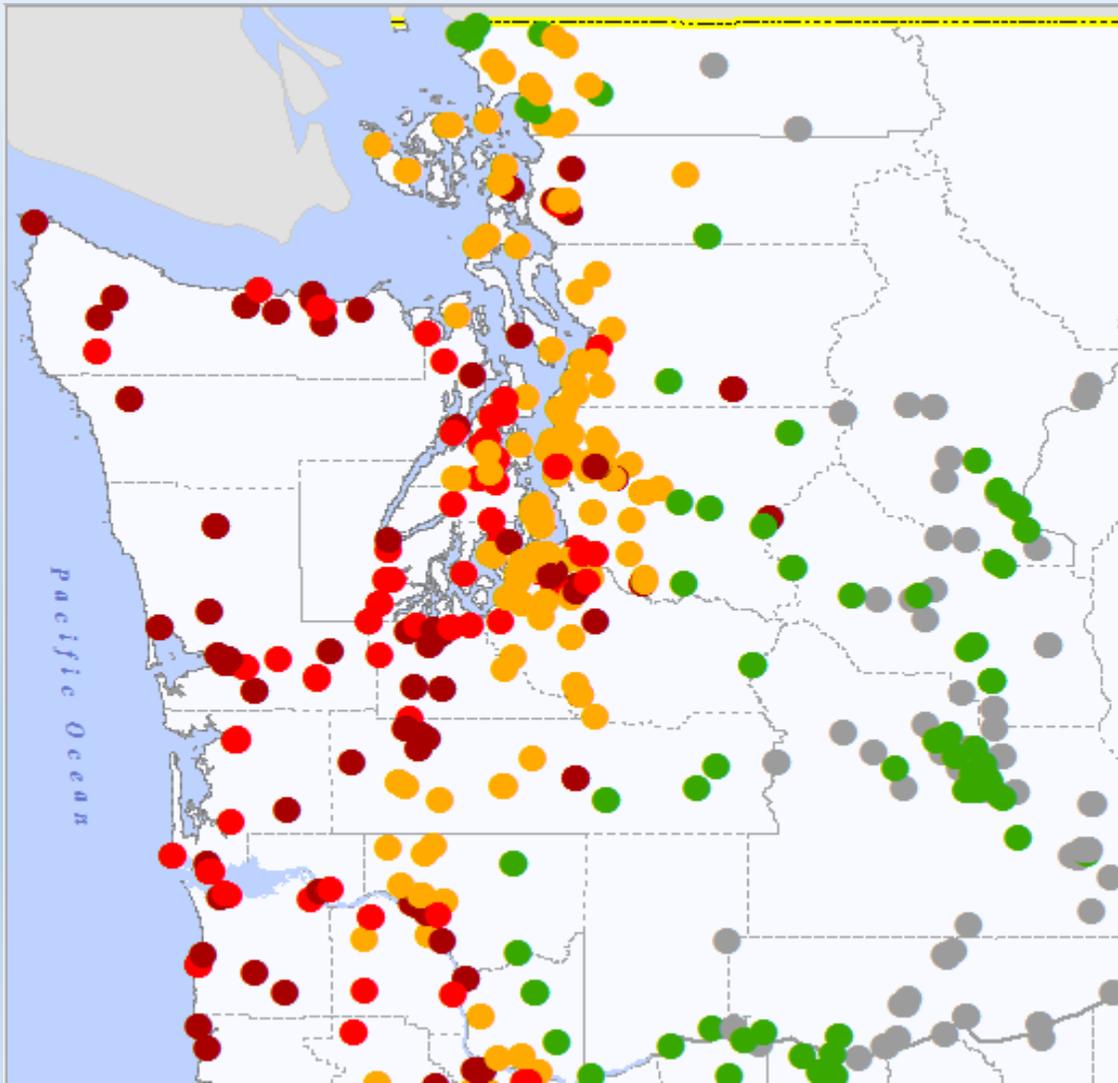
-  Complete = Totally Destroyed
-  Severe = Severely Damaged – Not Useable
-  Moderate = Moderately Damaged – 50% Capacity
-  Slight = Slightly Damaged – Useable
-  None = Not Damaged

The HITRAC study is designed and intended to be **REPRESENTATIVE** not **PREDICTIVE**.

Interpretation of HITRAC symbols associated with CSZ effects to Critical Infrastructure and Key Resources (CIKR), as interpreted by WA NG Joint Planning Team.



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.

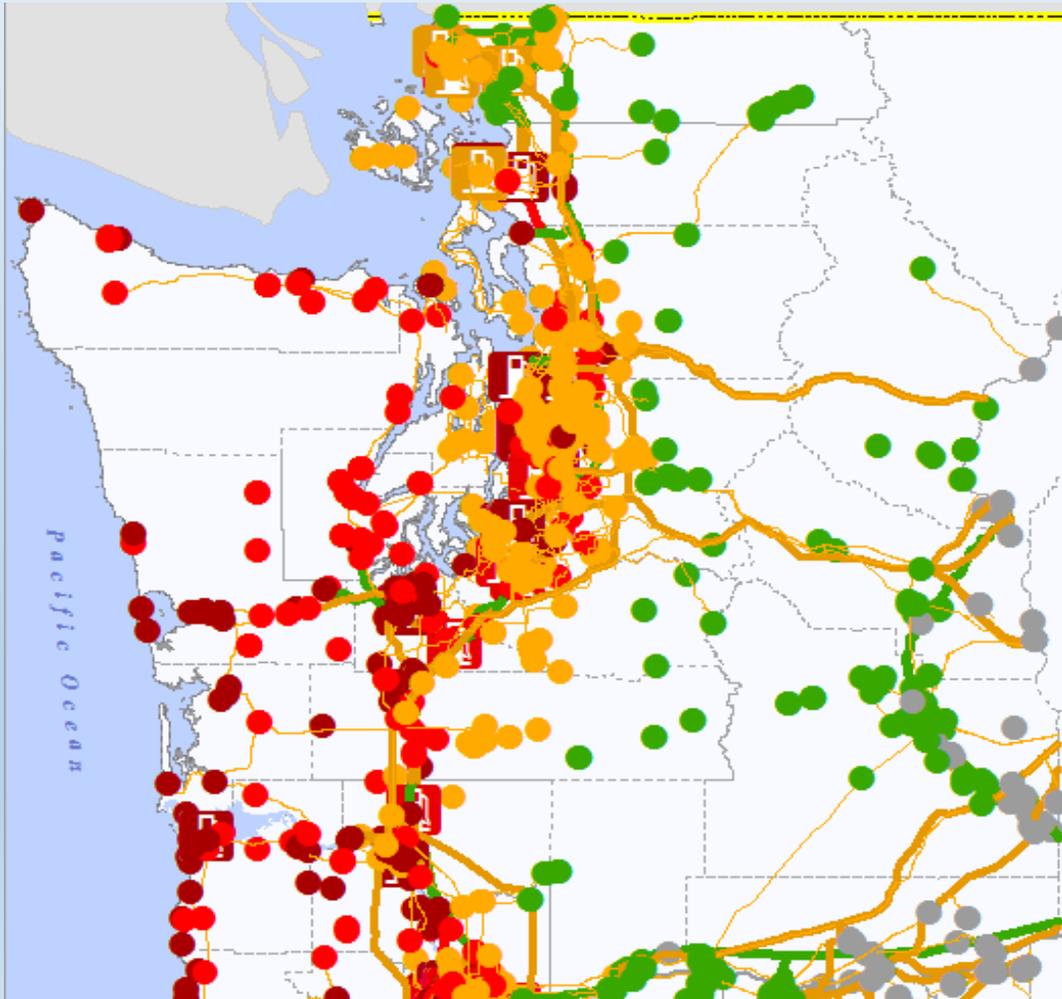
These factors will greatly affect mass communications ability. Does not account for the cellular control facilities and/or switchboards.



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Utilities



The amount of damage decreases from West to East.

There are approximately 440 major electrical facilities and a vast network of electrical power lines, both above and underground throughout the region.

There are 68 major Natural Gas facilities and 12 counties contain 22 major sections of NG pipe network.

There are 54 petroleum processing facilities, and 9 counties contain 16 major sections of petroleum pipeline.

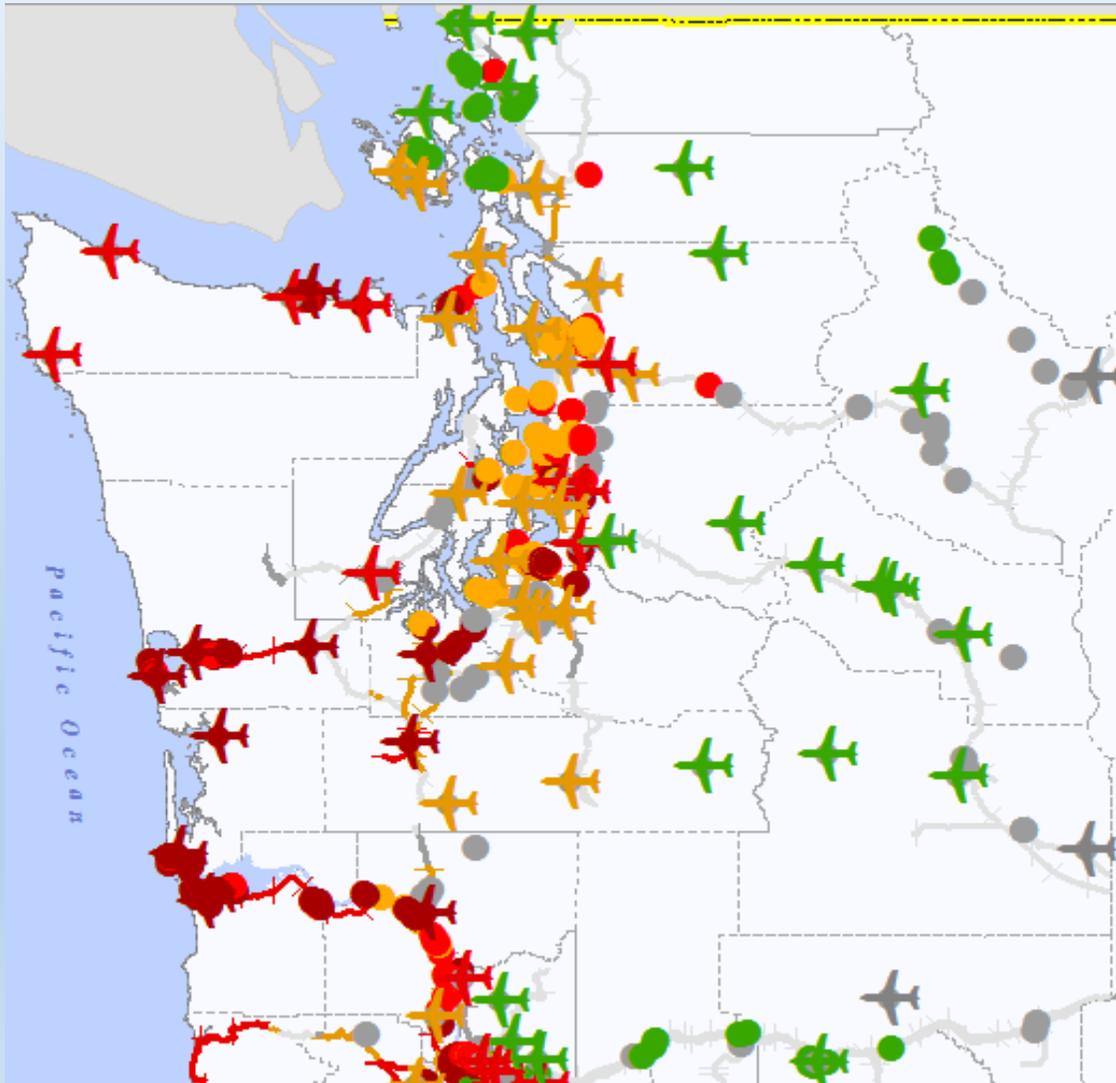
There are 35 known Potable Water Facilities.



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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

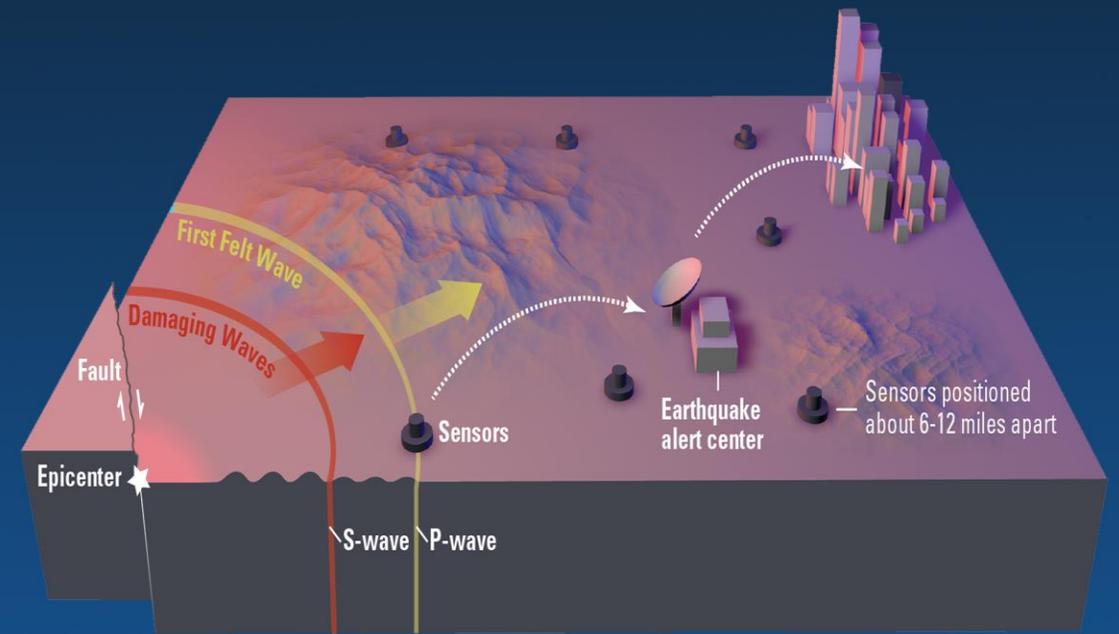


Other facilities/impacts to consider:

- Schools
- Hospitals
- Long Term Care Facilities
- Police, fire, Emergency Medical Services
- Supply Chains
- Commuter routes
- Etc.



ShakeAlert™



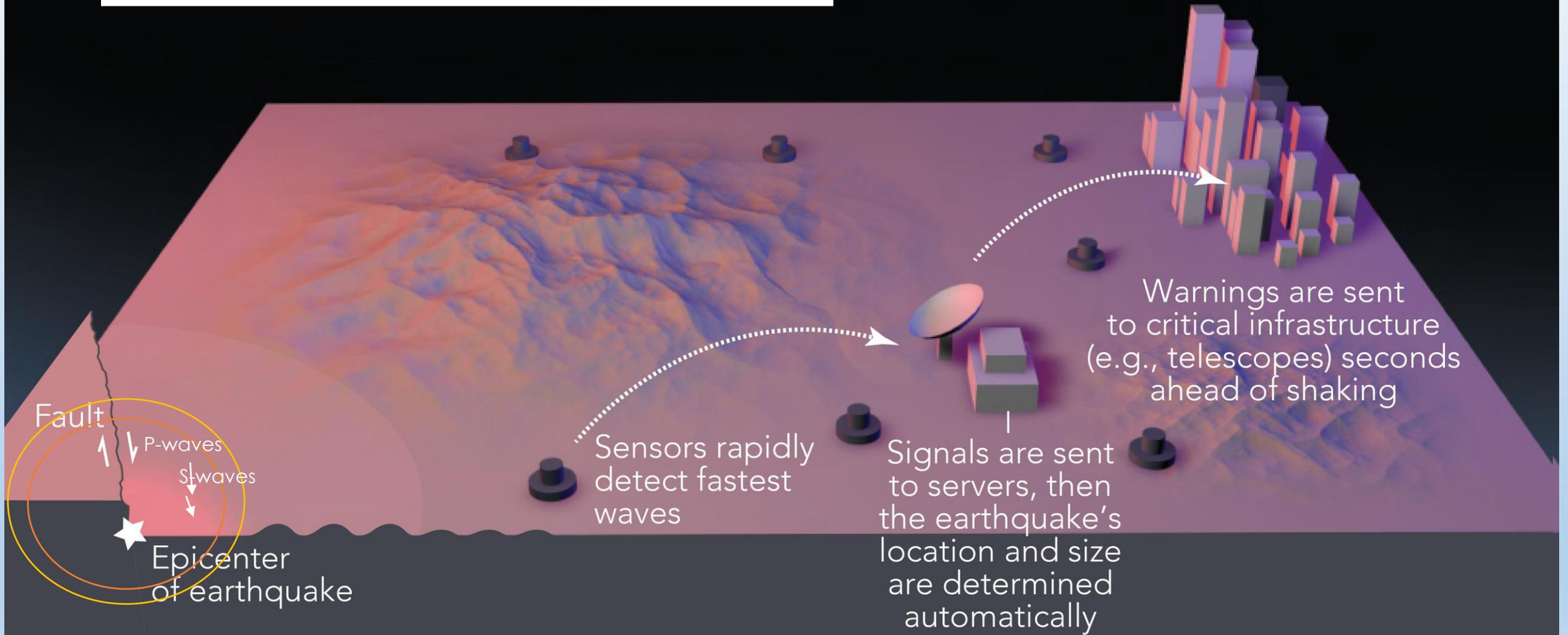
**An Earthquake Early Warning
System for the West Coast of
the United States**

**What if there was a way to tell you
an earthquake has occurred ...**



BEFORE the shaking started?

ShakeAlert™





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How will people use it?

- Drop, Cover, and Hold on
- Move away from hazardous areas
- Secure Delicate Procedures





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How can automatic systems use it?

Elevators



Elevators Return to Closest Floor and open doors



Avoids getting stuck in elevators





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Transit



Automatic Braking Systems



Speed Reduced



Industrial Sites



Automatic & Pneumatic Activated Industrial Shut off Valves



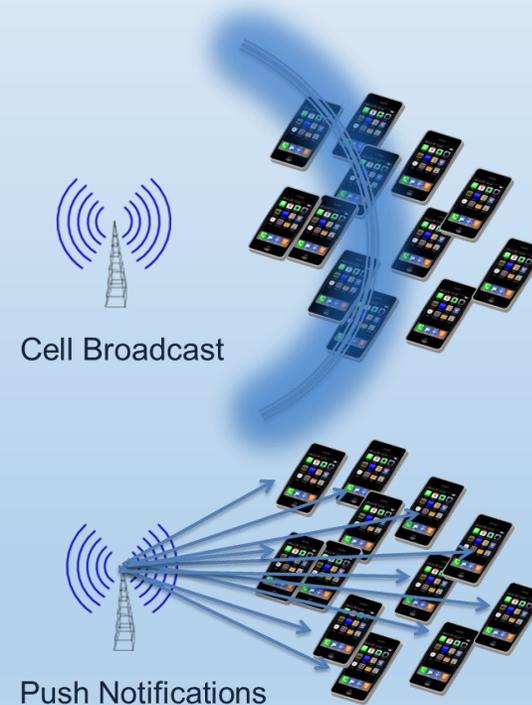
Avoid a Disaster within a Disaster





Public Alerting Coming Soon – Spring 2021

- Cell apps (2WeeksReady), push notifications
 - Scalability & speed unknown (Tests by City of L.A. and others, 2WeeksReady)
 - Someone must provide the service
- Cell-broadcast, IPAWS/WEA
 - Speed uncertain (test soon)
 - No EEW-specific sound



Now What?



What is “preparedness”?

Disasters
Happen

Actions
you take
to reduce
the impact of
disasters

Preparedness is:



Preparedness is *not*:



Rather than scrambling when disaster strikes and supplies are short for everyone, buy a little bit extra on every trip.



1

Know your hazards

2

Make a plan

3

Build kits

What is your risk?



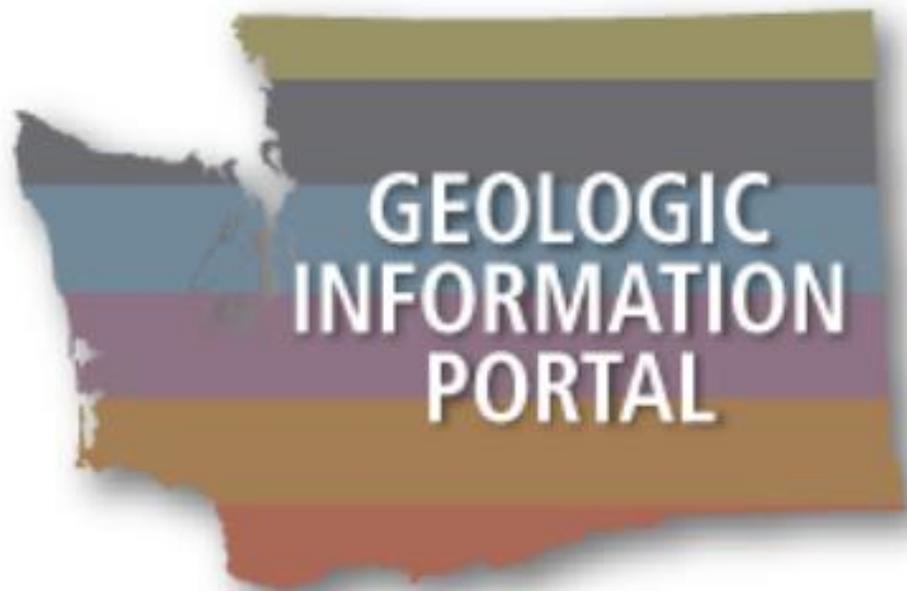
risk

dnr.wa.gov/geologyportal

Geologic Information Portal



The Washington Geologic Information Portal puts complex geologic and hazards information into the hands of everyone, including you. This application allows you to quickly compare and synthesize data of different types to help solve a variety of problems. Enter the Portal by clicking the icon below.





Find address or place



Table of Contents

Search layers:

- ▶ Geologic Mapping
- ▶ Earthquake
- ▶ Seismic Scenarios
- ▶ Landslide
- ▶ Tsunami
- ▶ Volcanoes
- ▶ Subsurface
- ▶ Earth Resources Permit Locations
- ▶ Geothermal
- ▶ Minerals

What are the local hazards?

Earthquake
Landslide
Volcanic Ash

Geological

Wildfire

Terrorist activity and civil action

Infrastructure failure

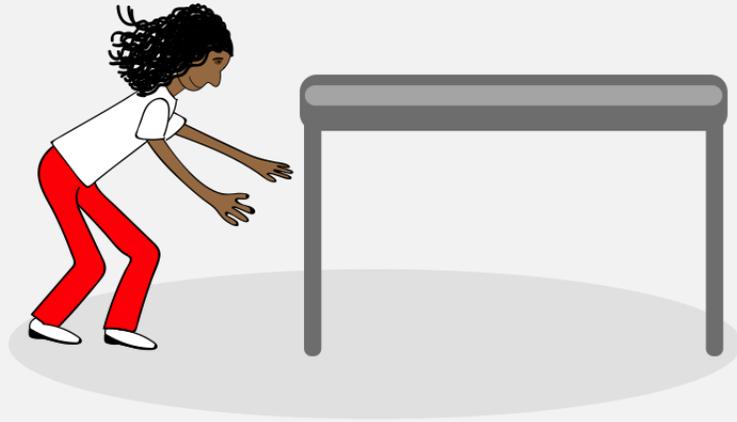
Pandemic

Human-caused hazards

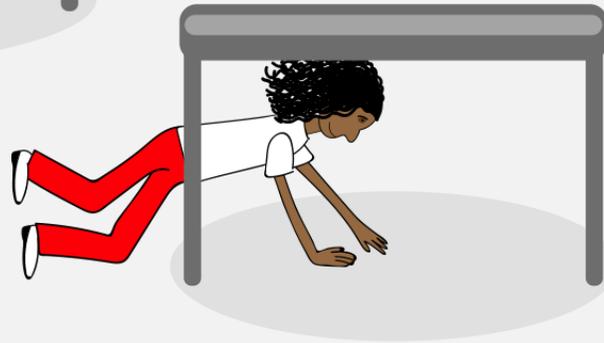
Climate change
Drought
Flood
Severe weather

Meteorological

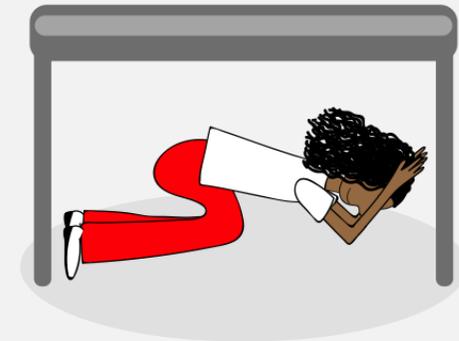
What to do during an earthquake



drop



cover



hold on

Using a cane



Using a walker



Using a wheelchair



What to do after an earthquake



BE PREPARED



MAKE A PLAN

Determine an accessible meeting place in case you have to leave your home or work, so you can reunite your family.





LEARN ABOUT DISASTER PLANS FOR

Your work

Your children's school

Your medical and/or transportation provider

Other places where your family spends time



School/Work Plans





DEVELOP A COMMUNICATIONS PLAN



Write down
emergency
contact
information



Texts are
more likely
to go through

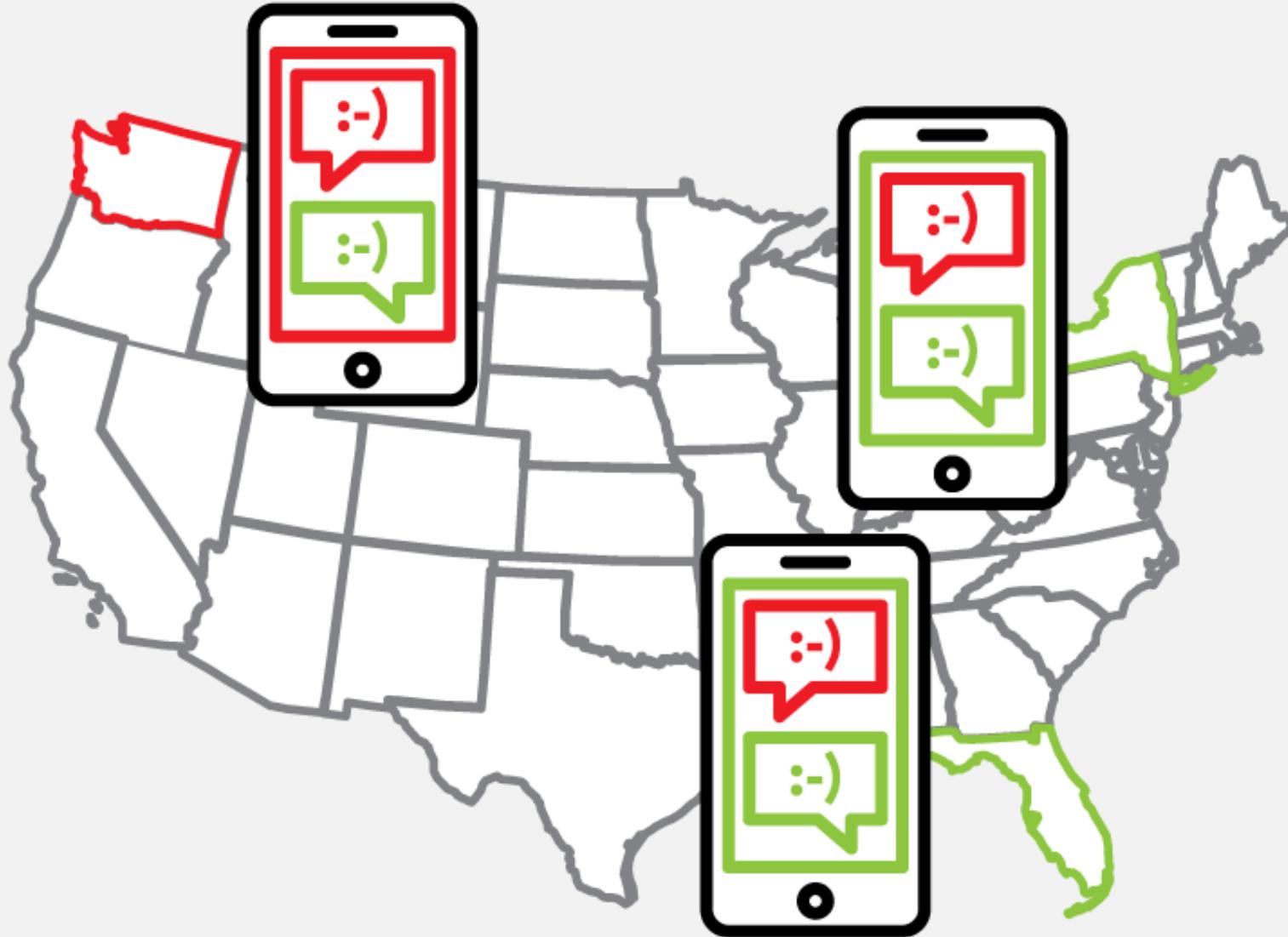


Have an extra
cell phone
charger and
batteries



An out-of-area
contact can serve
as a relay point
for family
communication

Out-of-Area Contact



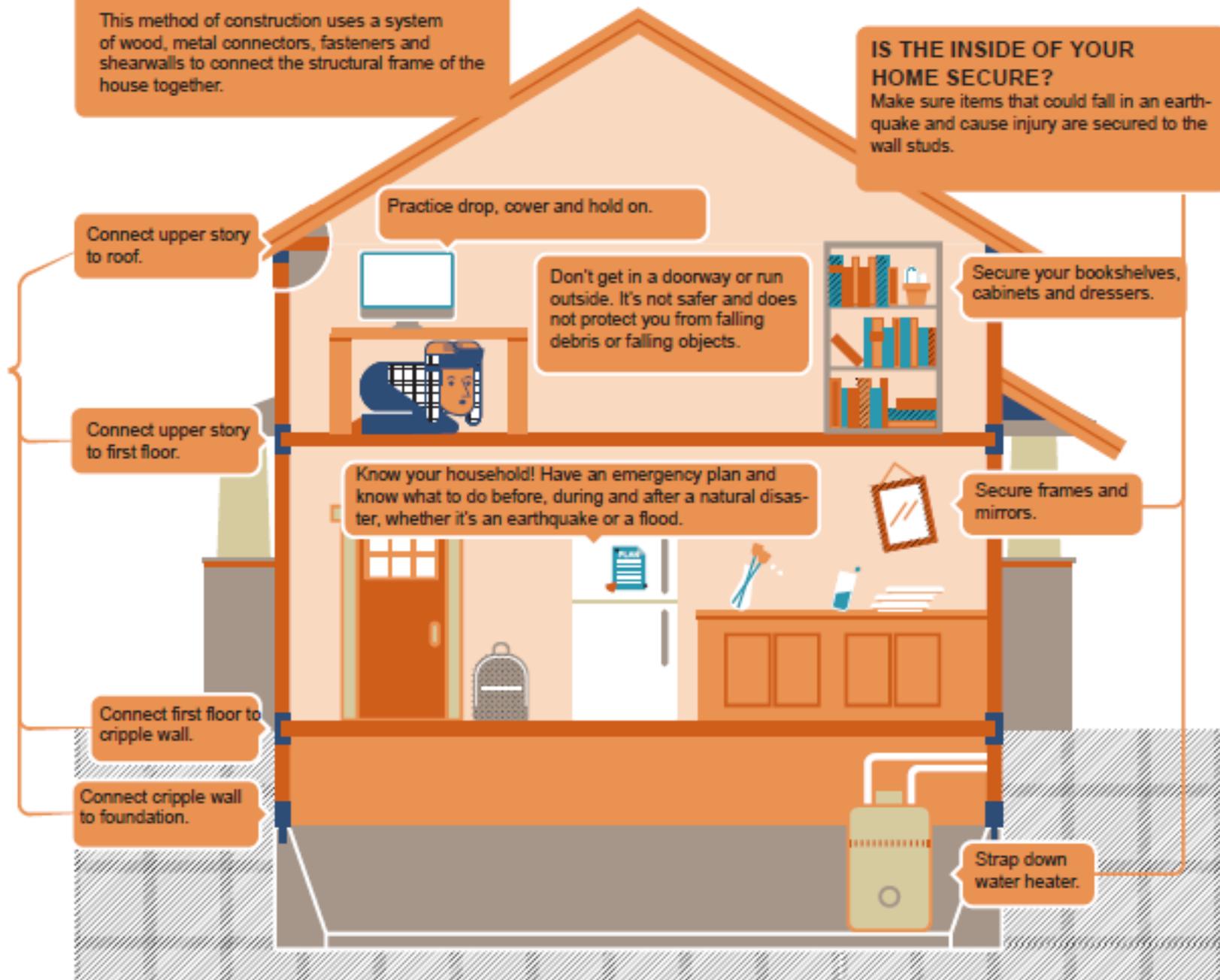
Home Hazard Hunt

WHAT IS A CONTINUOUS LOAD PATH?

This method of construction uses a system of wood, metal connectors, fasteners and shearwalls to connect the structural frame of the house together.

IS THE INSIDE OF YOUR HOME SECURE?

Make sure items that could fall in an earthquake and cause injury are secured to the wall studs.

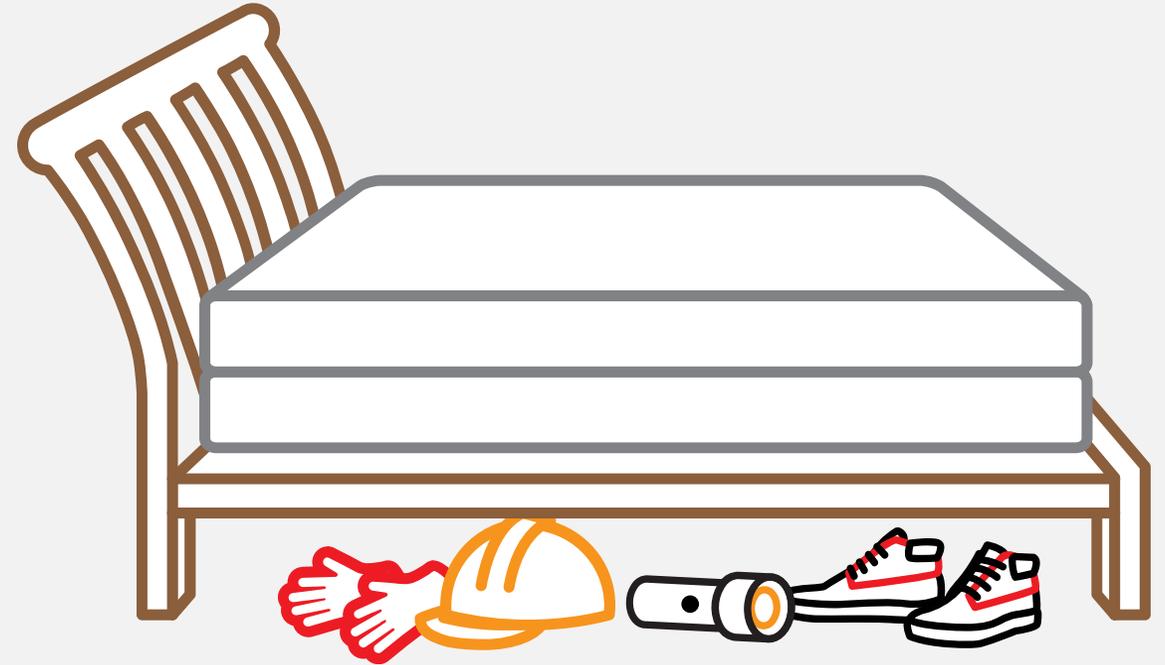
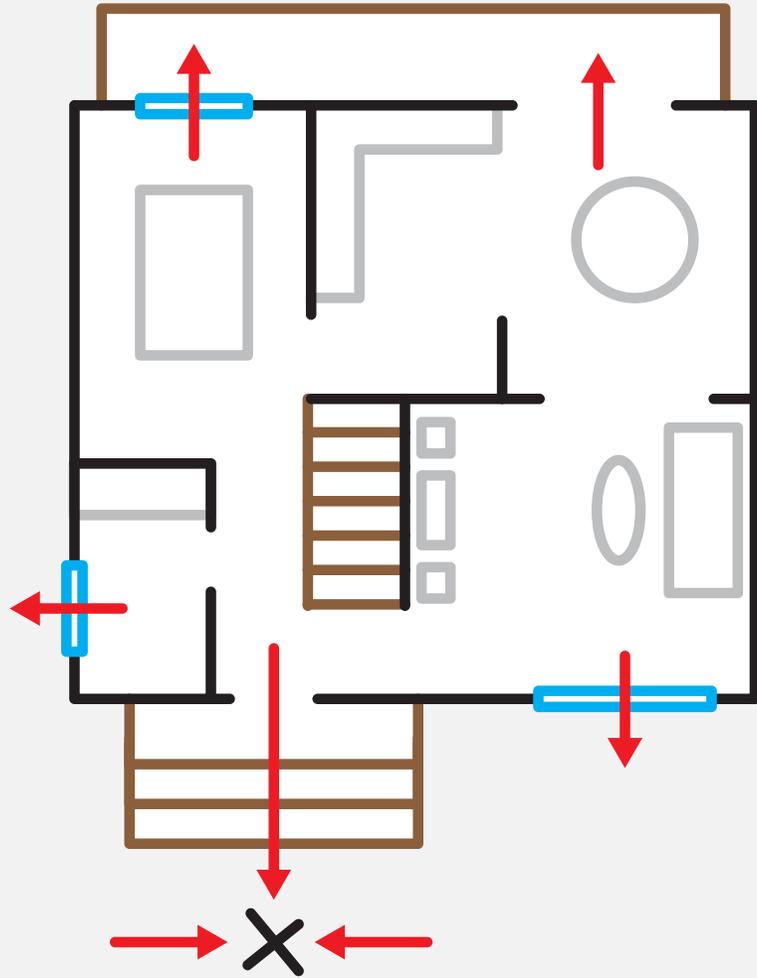


Retrofit your home

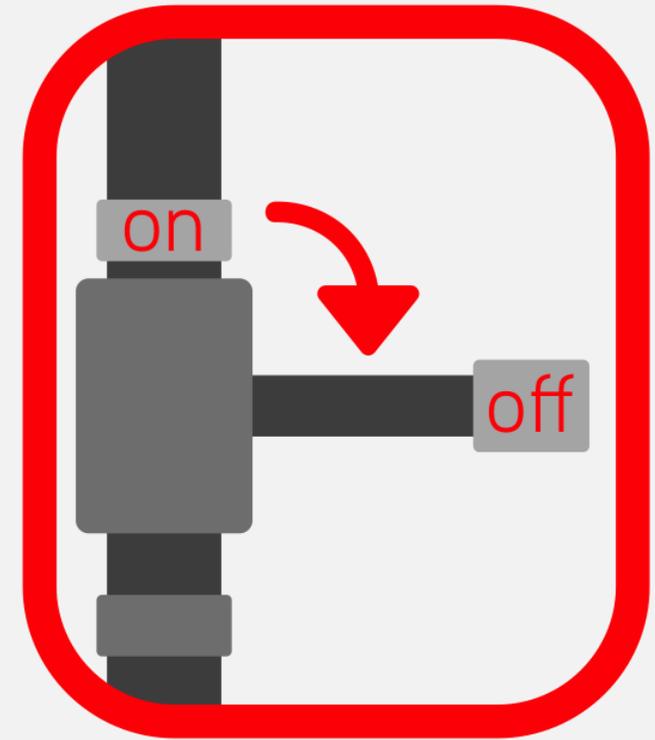
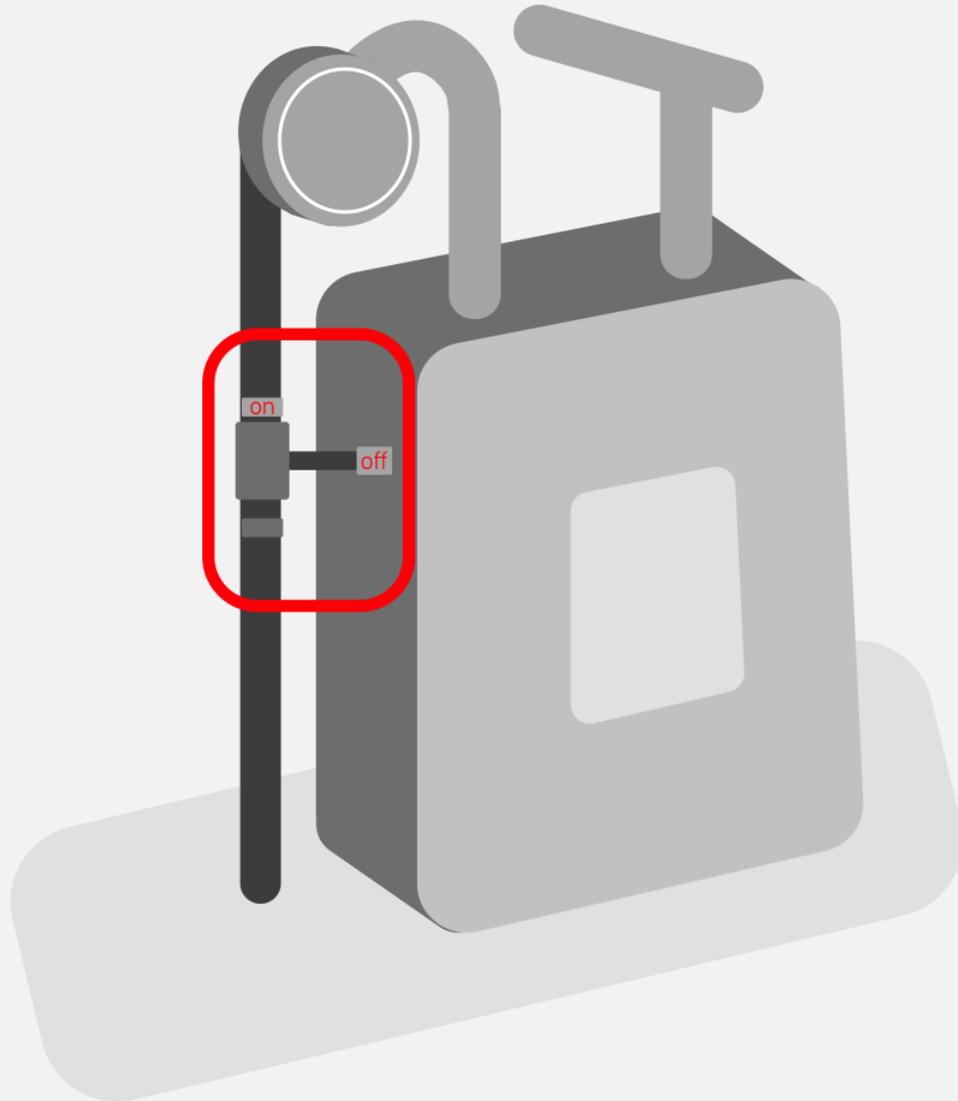


secure large items

Preparing at Home

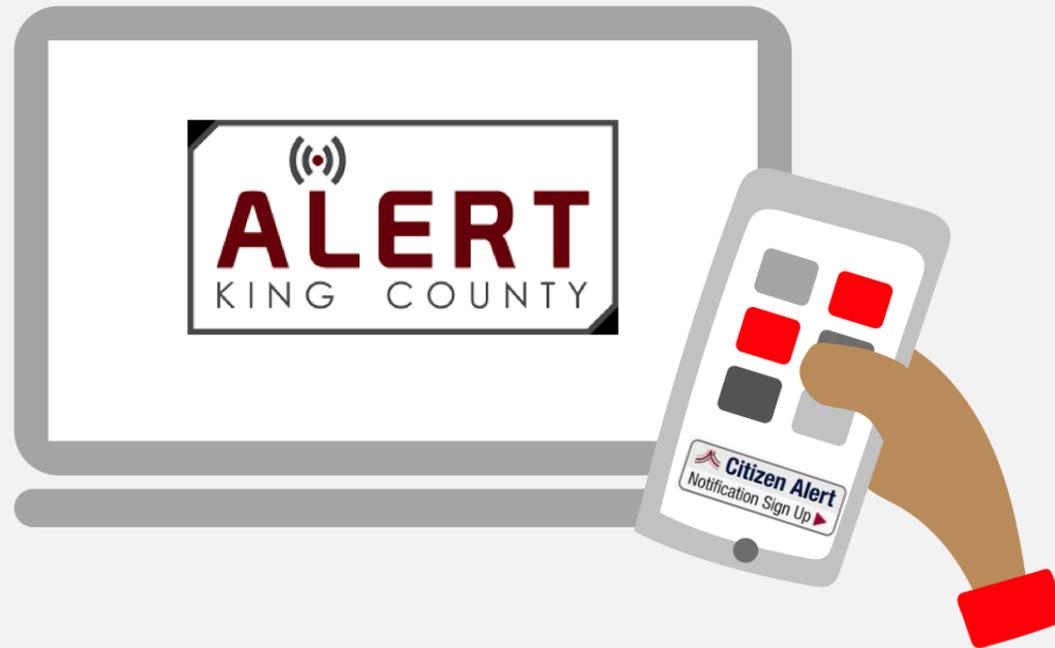


Know how and when to control utilities



Sign-up for emergency alerts

sign up





→ Sign up for
LOCAL EMERGENCY ALERTS

MIL.WA.GOV/ALERTS

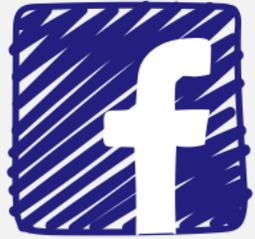
to receive alerts for:

- ! imminent hazards
- ! immediate emergencies
- ! where to go
- ! what to do

Free to all people in Washington



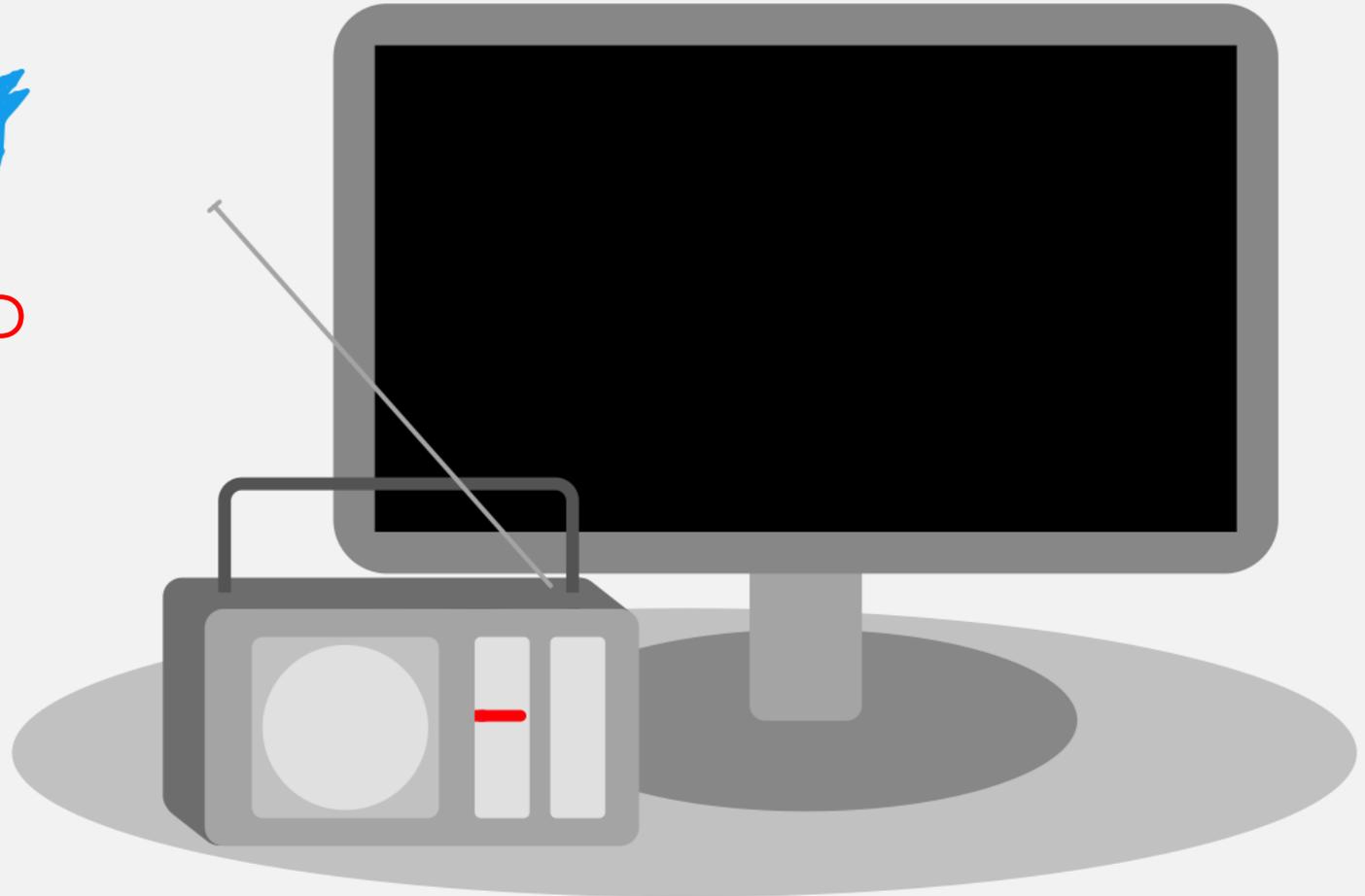
Stay Informed



washEMD



@waEMD



Build kits



2 WEEKS READY

BUILD KITS

Plan to be on your own for at least 2 weeks



Water (1 gallon per person, per day)



Food (non-perishable)



Comfort/entertainment



Medical equipment



Glasses/eye care



First aid kit



Can opener



NOAA alert radio



Flashlight



Personal hygiene items



Tools



Pet supplies



Cash



Toilet paper



Medications



Identification & important documents



Sturdy shoes



Extra batteries



Warm clothes

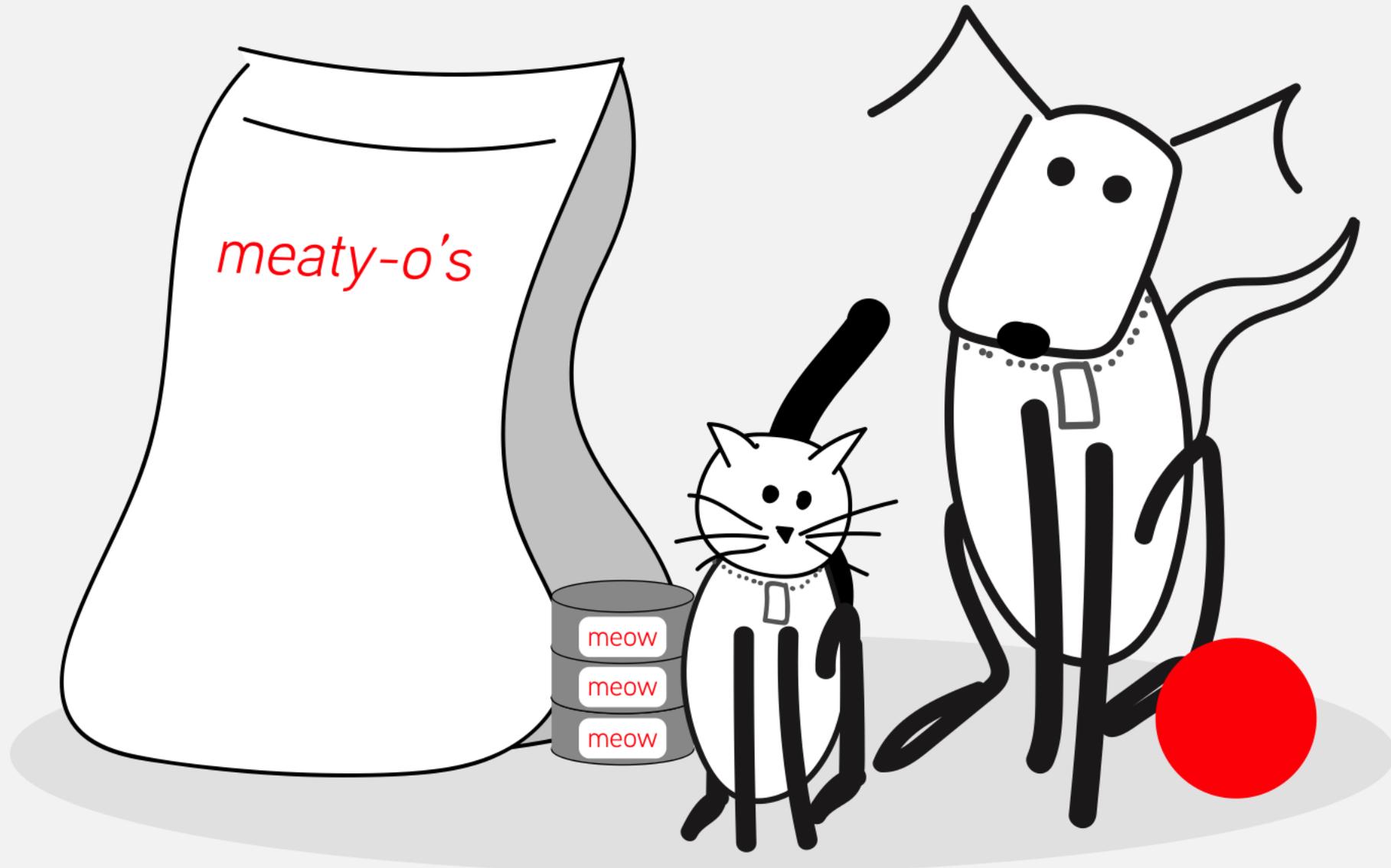


Fire extinguisher



Keep at least 2 weeks of supplies in your home. Have smaller kits for work, for every family member, and pets. Have a vehicle safety kit too.

Pets too!



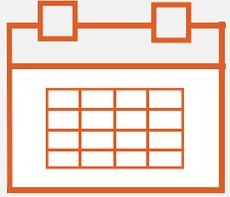
Water tips & storage



The Preparedness Continuum



Prepare in a Year



mil.wa.gov/preparedness

Complete **1** activity a month to prepare you and your family for disasters!



Make a
Communications Plan



Create an
Action Plan



Store Water



Build Grab & Go
Kits



Secure Important
Documents



Be 2 Weeks Ready



Learn Fire Safety



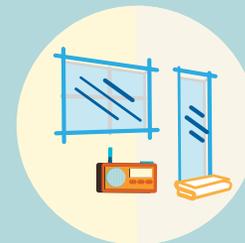
Learn Utility Safety



Store Under the
Bed Supplies



Practice Drop,
Cover, and Hold On



Prepare to
Shelter in Place



Conduct a Home
Hazard Hunt

Prepare in a Year



Secure Important Documents



Collect copies of important documents and store them in a safe place.



[DisasterReadyWashington.com](https://www.DisasterReadyWashington.com)



OCTOBER 15, 2020

@ 10:15am

Join us for the largest statewide
Earthquake Drill & Tsunami Siren Test



DROP!



COVER!



HOLD ON!



GO TO HIGH GROUND!
The Shaking Is Your Tsunami Warning

REGISTER: www.shakeout.org/washington

The Great Washington ShakeOut 2019:

1,500,000

participants



Register at shakeout.org/washington

Questions?

Resources

Free Downloads:

www.mil.wa.gov/preparedness

Webinar Recording:

<https://www.youtube.com/user/EMDprepare>



mil.wa.gov/preparedness