



The Impacts of the Cascadia Subduction Zone Earthquake on Eastern Oregon

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What does this mean to Eastern Oregon?

Physical impact on built environment?

Impact on the people of Eastern Oregon?

What will be the economic impact?

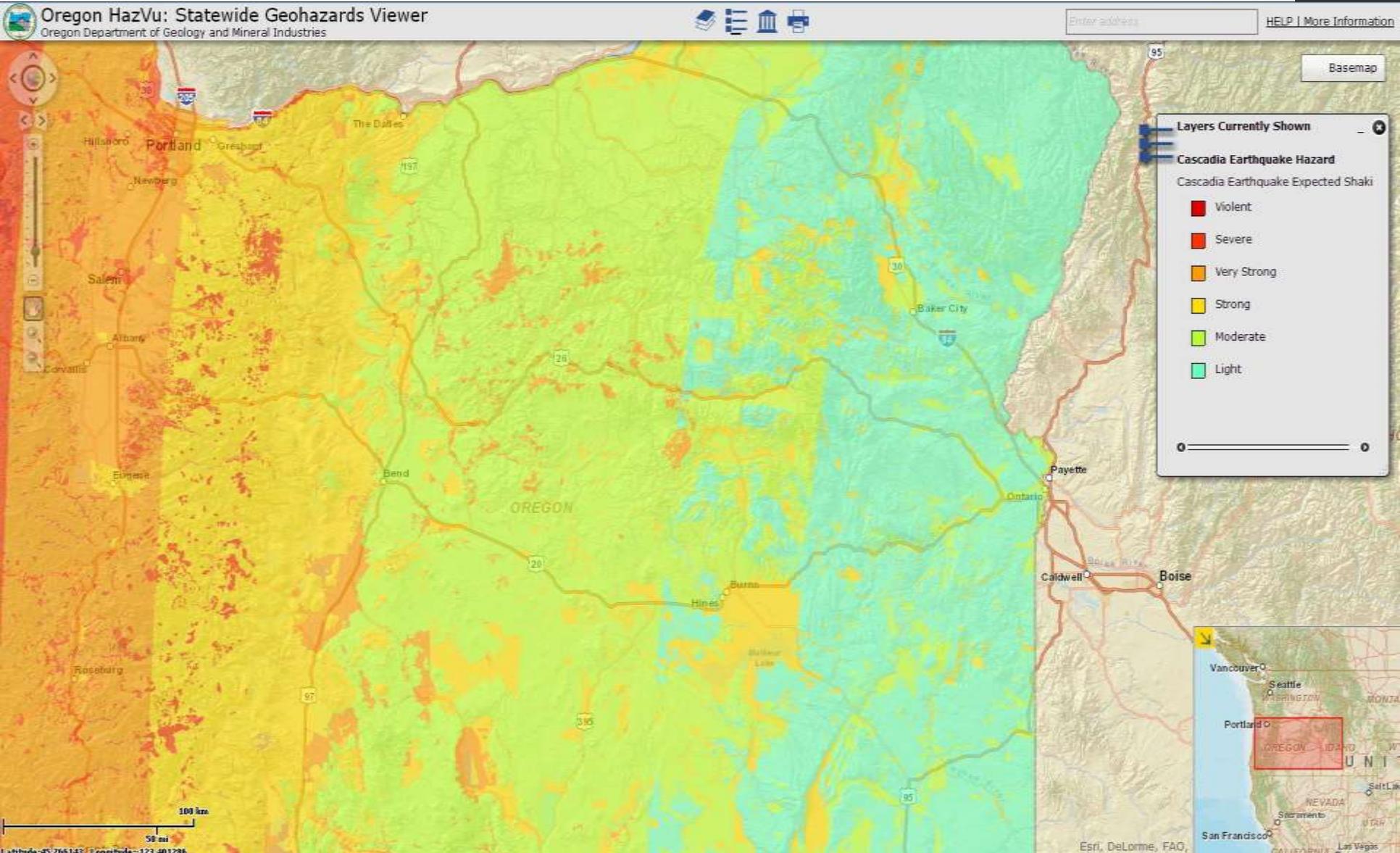


Impacts on Western Oregon

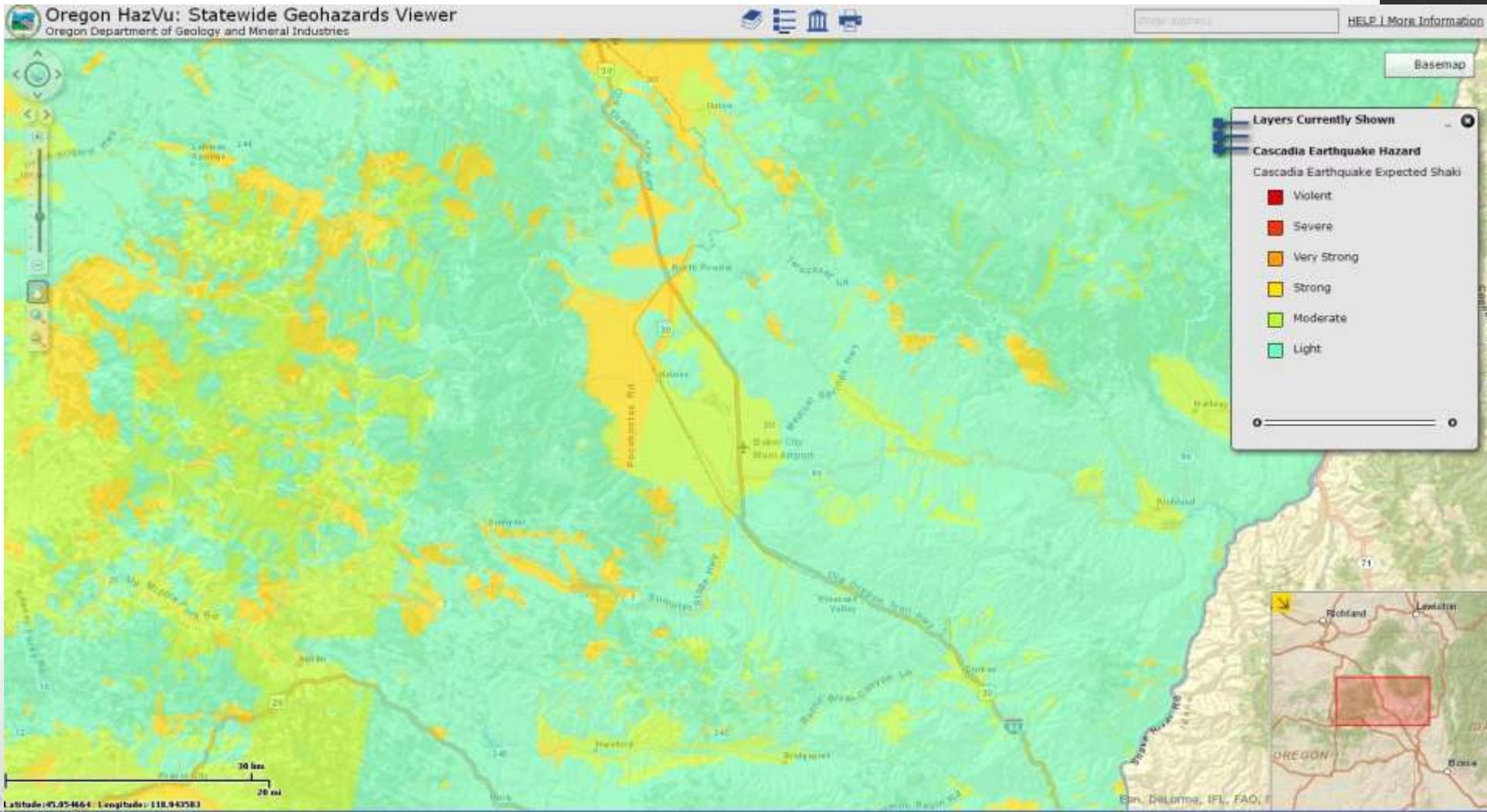
- Earthquake deaths ranging from 650 to 5,000, with another 600 to 5,000 deaths due to the tsunami.
- 24,000 buildings completely destroyed, and another 85,000 with extensive damage requiring months to years of repair.
- 27,600 displaced households.
- Approximately \$32 billion in economic losses.
- Almost 10 million tons of debris (1 million dump truck loads).



Shaking Intensity in Eastern Oregon from CSZ



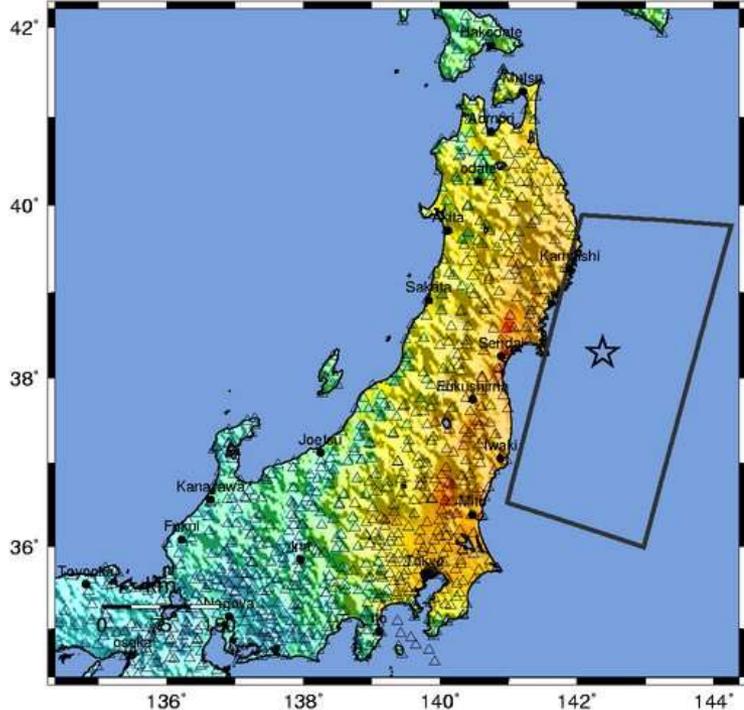
Shaking Intensity in Baker City



Compared to Japan 2011 EQ

USGS ShakeMap : NEAR THE EAST COAST OF HONSHU, JAPAN

Fri Mar 11, 2011 05:46:24 GMT M 9.0 N38.30 E142.37 Depth: 29.0km ID:c0001xgp

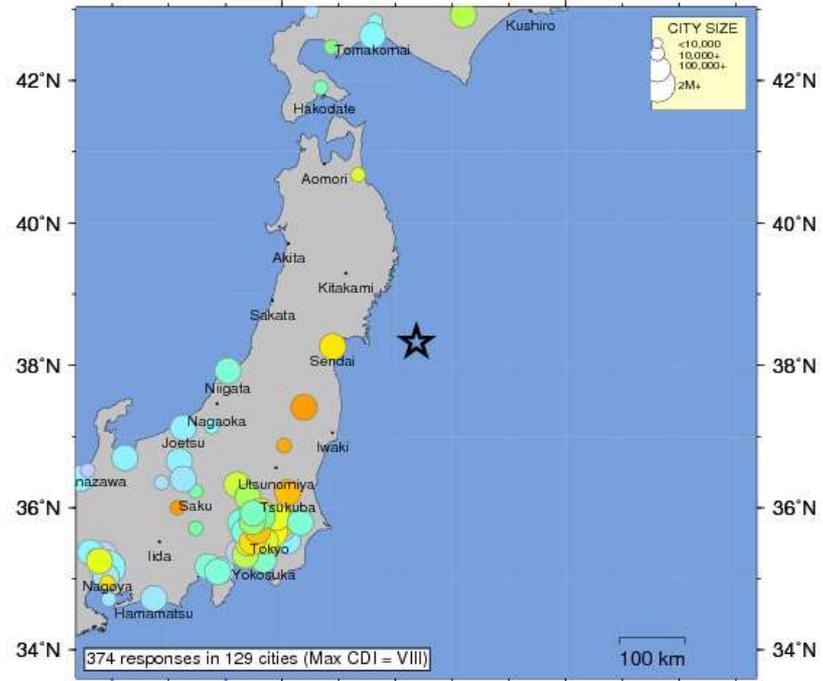


Map Version 14 Processed Thu Aug 18, 2011 08:22:47 AM MDT - NOT REVIEWED BY HUMAN

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

USGS Community Internet Intensity Map
NEAR THE EAST COAST OF HONSHU, JAPAN

Mar 11 2011 14:46:23 local 38.322N 142.369E Mb.9 Depth: 24 km ID:usc0001xgp



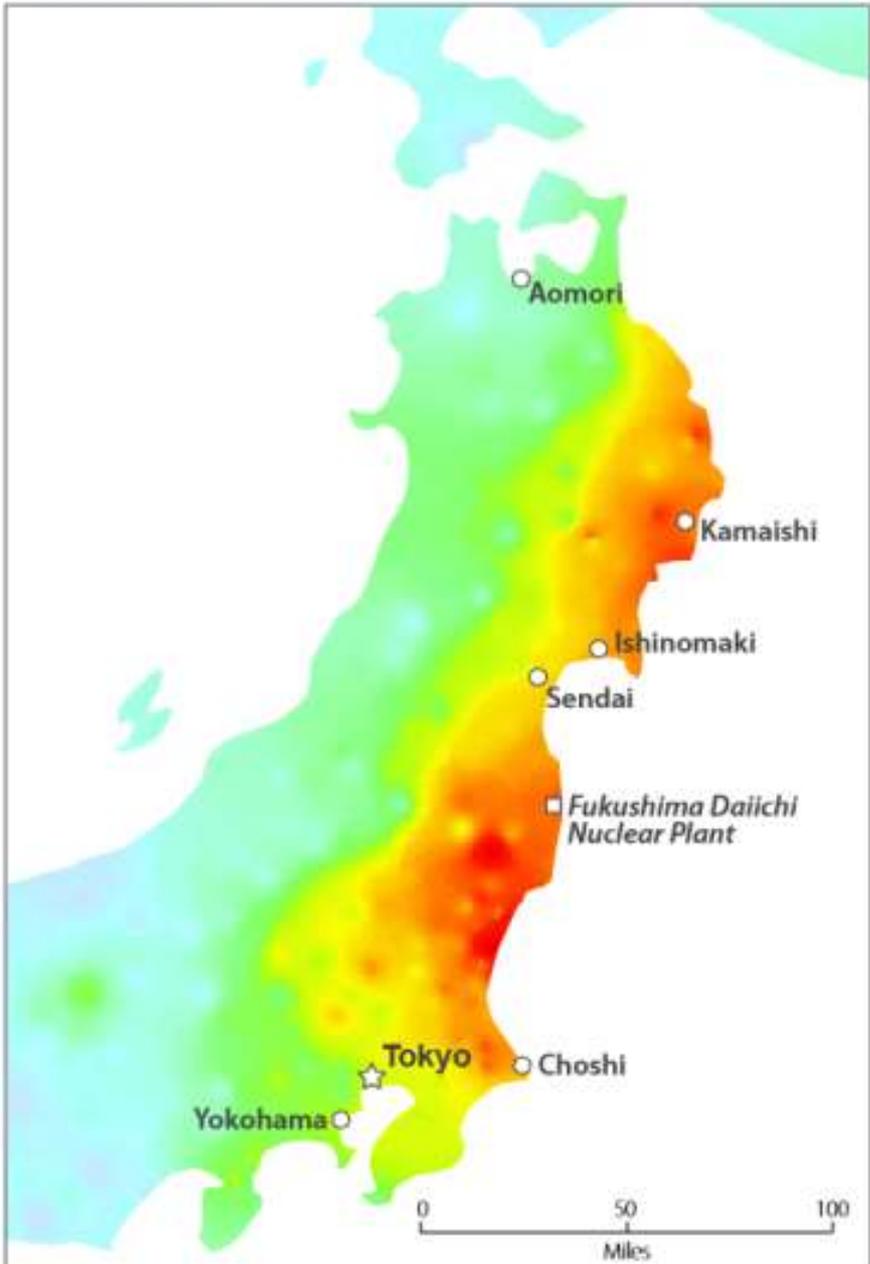
374 responses in 129 cities (Max CDI = VIII)

	140°E	145°E
INTENSITY	I	II-III
SHAKING	Not felt	Weak
DAMAGE	none	none

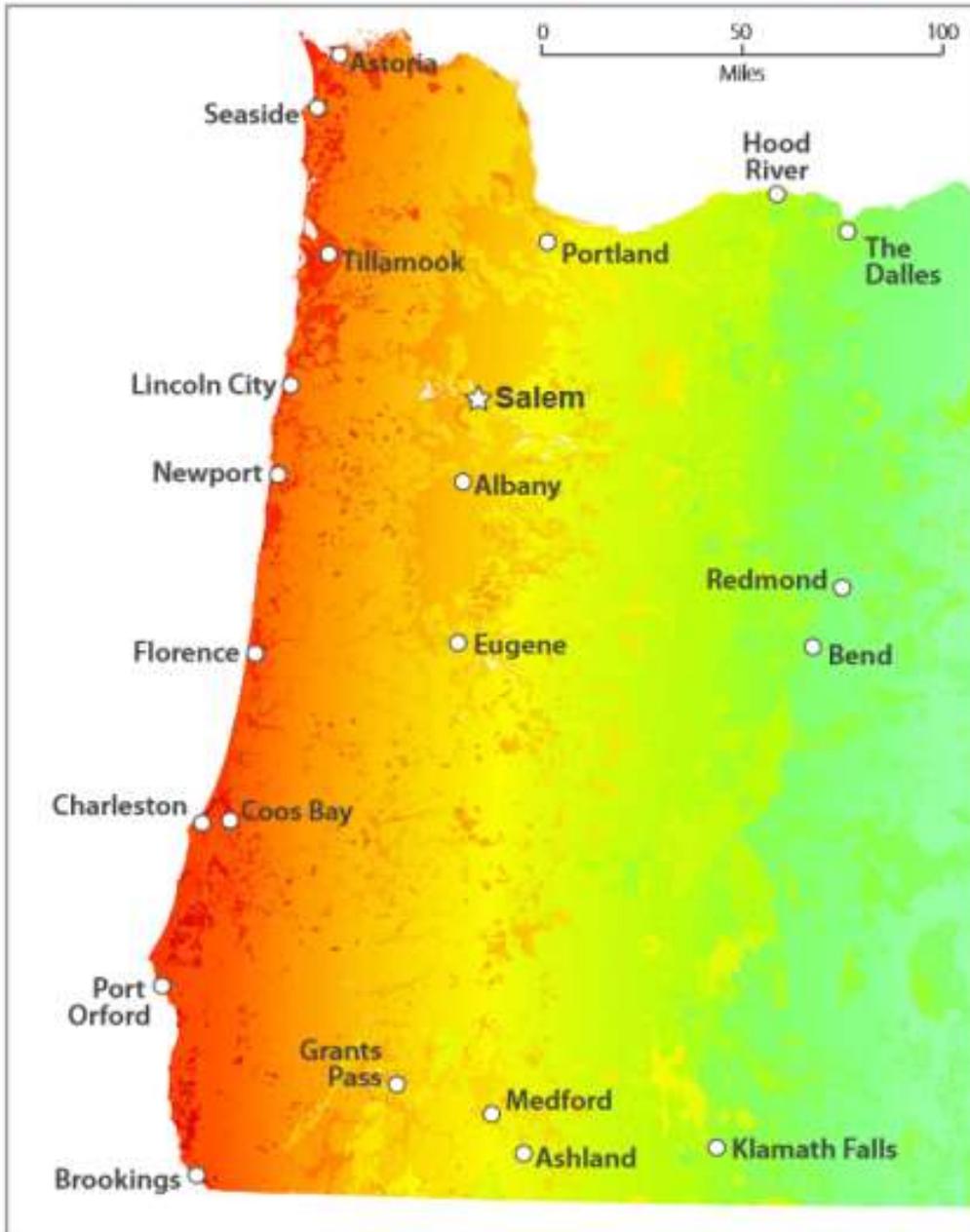
Processed: Fri Mar 11 14:29:21 2011



ShakeMap for March 11, 2011 Tōhoku M9 earthquake



ShakeMap for SIMULATED M9 Cascadia earthquake



Conclusion: Light Physical effects

- Shaking Intensity
 - Light to moderate, with pockets of strong shaking
 - Modified Mercalli Scale I to VI
 - Felt by all
 - Some damage to plaster, chimneys
 - Significant damage unlikely



But ...

- Buildings in eastern Oregon will experience ground shaking levels similar to or greater than those that URM buildings experienced during two previous Oregon earthquakes: Scotts Mills and Klamath Falls.
- Because the Cascadia subduction zone earthquake will likely be of much longer duration than these two previous events, it has the potential to cause even more damage.
- For this reason, the expected recovery duration for vulnerable buildings in eastern Oregon was determined to be 30 days.





It doesn't take a building collapsing to cause injury



Pendant light fixtures failed in this elementary school library during the 1983 M6.5 Coalinga, California earthquake. If the room had been occupied, this could have caused injuries.

Bracing nonstructural elements in homes, schools, and offices can often be done easily and relatively inexpensively. (Source: NOAA/NGDC, Earthquake Engineering Research Institute)



Most impacts will be secondary



Transportation
& Energy



Relief &
Response



Economy



Energy Interruption

Electricity

Natural Gas

Liquid Fuel



Transportation & Energy

State of Oregon's bridges

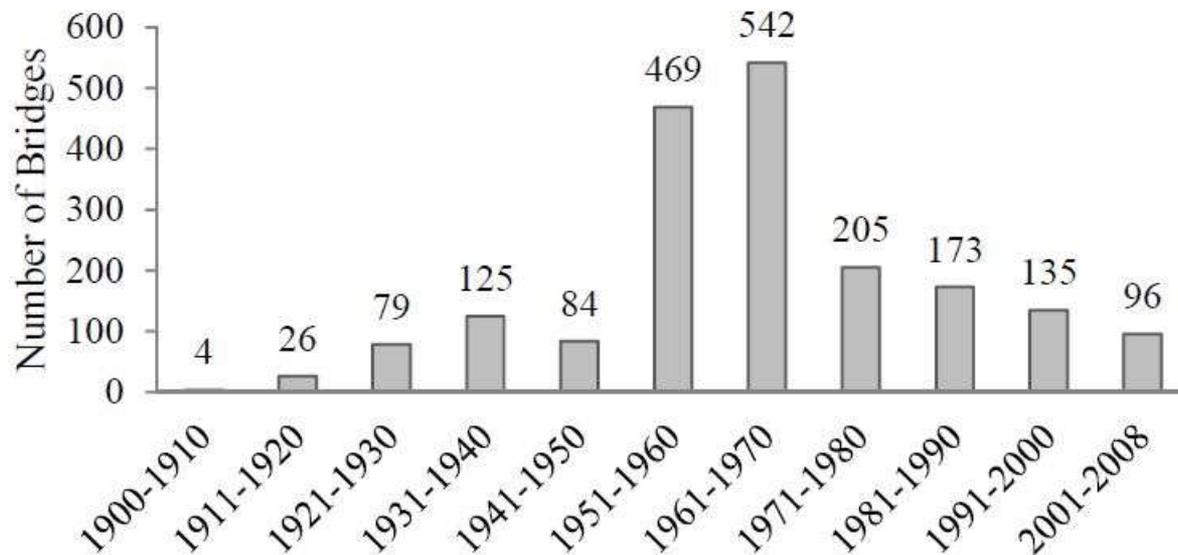


Figure 3: Distribution of year of construction completion

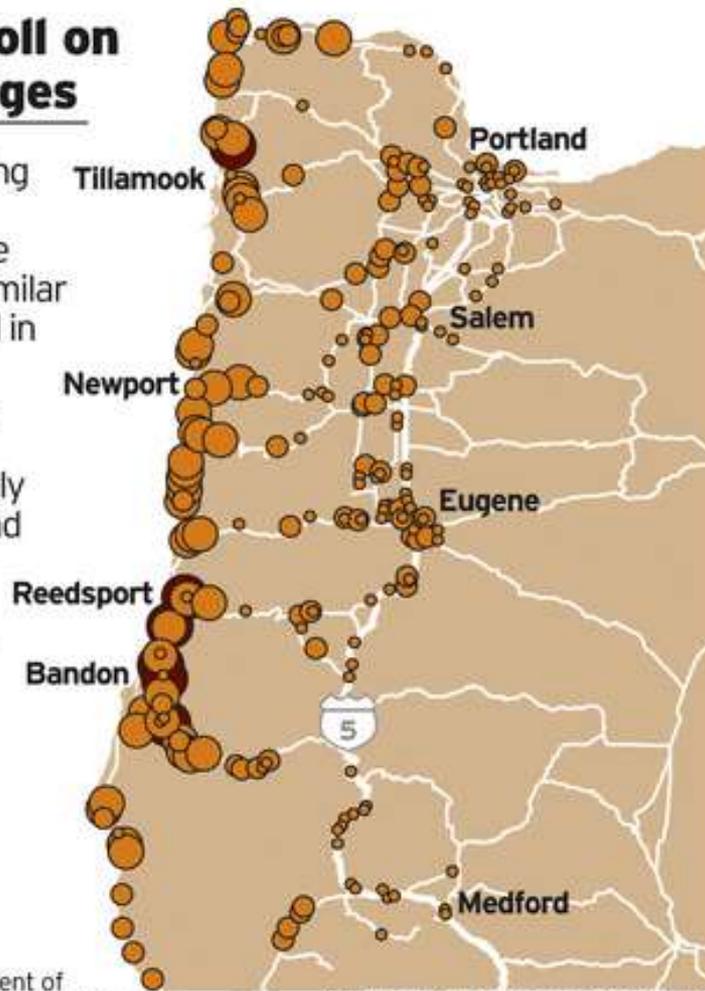


State of Oregon's bridges

A quake's toll on Oregon bridges

Computer modeling shows a 9.0 earthquake off the Oregon coast – similar to what happened in January 1700 – would collapse six major highway bridges, extensively damage others and cost \$1 billion for bridge repair and replacement.

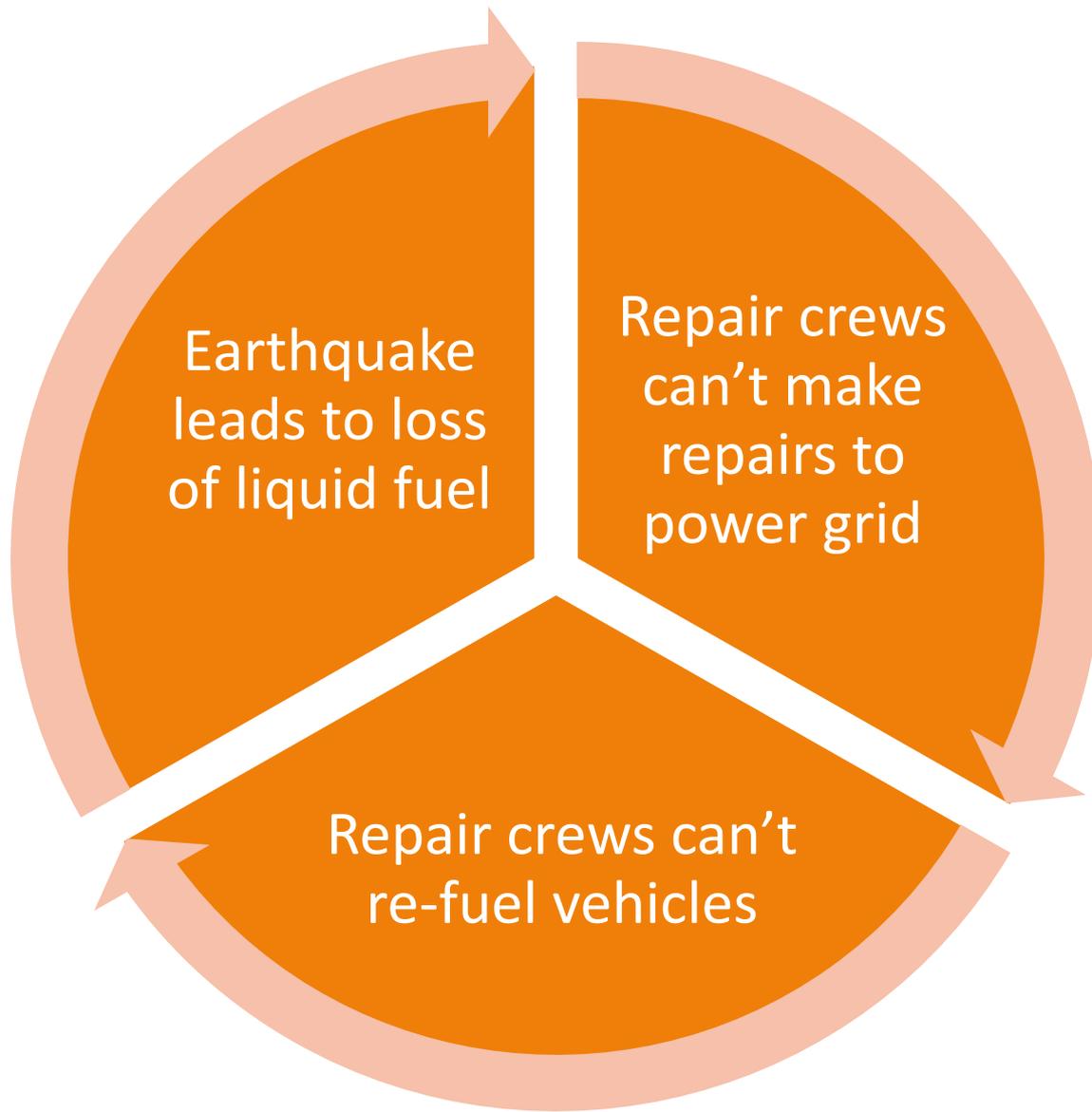
- Slight
- Moderate
- Extensive
- Collapse



Source: Oregon Department of Transportation/Portland State University

STEVE COWDEN/THE OREGONIAN





Relief and Response

- Eastern Oregon will become the main area of support functions
- Supply side chain distribution (including fuel, food, and natural gas)
- Demand for logistics and staging areas
- Shelter, and relocation of individuals and animals from the impacted areas.



Response Plans

- Cascadia Catastrophic Plan
- Cascadia Playbook



OEM's Requirements for Playbook

Honoring existing Cascadia plans and efforts

Not recreating the wheel

Initial response - From ground shaking to first 14 days

Framework can be used for any disaster event

Clearly established decision-making bodies

Focused on action items

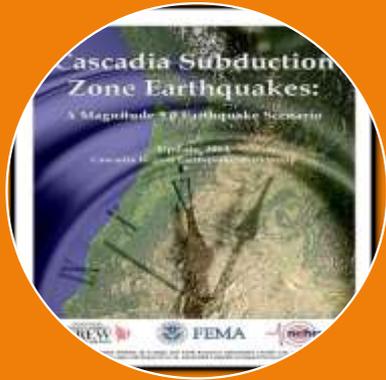
Organized by Essential Support Function -18 ESF structure

Plays are comprised of tasks to achieve specific objectives

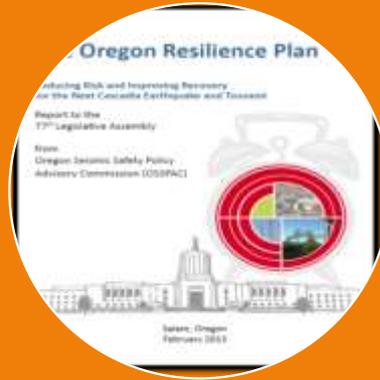
Punch list of items for each ESF



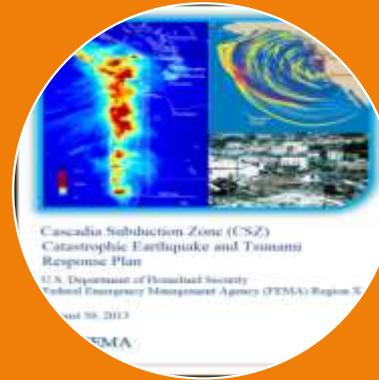
Deriving Content for the Playbook



Sourced from existing Cascadia plans for cross referencing and consistency



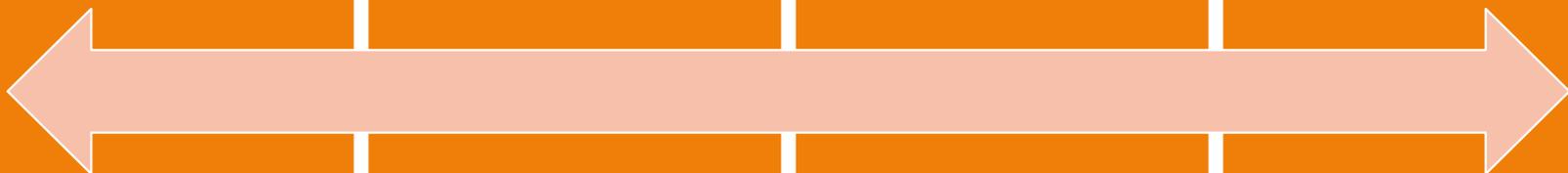
Oregon Cascadia Subduction Zone Plan



FEMA Region X CSZ Plan – Execution Matrix



Content for Ops and Activations from ORS 401.165





Initial response in the event of ...

DISASTER EVENT!

- | | | | | | | | | |
|---|--|--|---|--|--|--|--|---|
| <ul style="list-style-type: none"> • Notify Governor • Emergency Declarations • Activate ECC • Succession / Authorities • Activate ESFs / AOCs | <ul style="list-style-type: none"> • Emergency Communications • Search and Rescue • Medical Care • Scene Stabilization | <ul style="list-style-type: none"> • Establish Lifeline Routes • Establish Contact with Affected Area • Assess Impacts / Damage • Identify Unmet Needs | <ul style="list-style-type: none"> • Establish Shelters • Transport Displaced People • Vulnerable Populations • Medical Care at Shelters • Mass Feeding • Animal Care | <ul style="list-style-type: none"> • Initiate Resource Requests • Locate / Receive Supplies • State Staging Areas • Points of Distribution | <ul style="list-style-type: none"> • Prioritize Emergency Repairs • Emergency Contracting • Contingency Plans • DMORT Operations | <ul style="list-style-type: none"> • Mobilize Heavy Equipment and Personnel • Clear debris • Repair Essential Systems • JIC Operations | <ul style="list-style-type: none"> • Receive Federal Resources • Expedite Out-Of-Area Utility Repair Crews • Facilitate Contracted Services • Volunteers and Donated Goods | <ul style="list-style-type: none"> • Identify Economic Recovery Priorities • Community Planning Needs • Begin Restoring Community Services • Begin Restoring Critical Systems |
|---|--|--|---|--|--|--|--|---|

PLAY 1	PLAY 2	PLAY 3	PLAY 4	PLAY 5	PLAY 6	PLAY 7	PLAY 8	PLAY 9
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Notification, Activation and Authorities	Life Safety	Damage Assessment	Mass Care and Sheltering	Logistics and Resources Management	Planning and Prioritizations	Emergency Repairs	Outside Assistance	Begin Recovery
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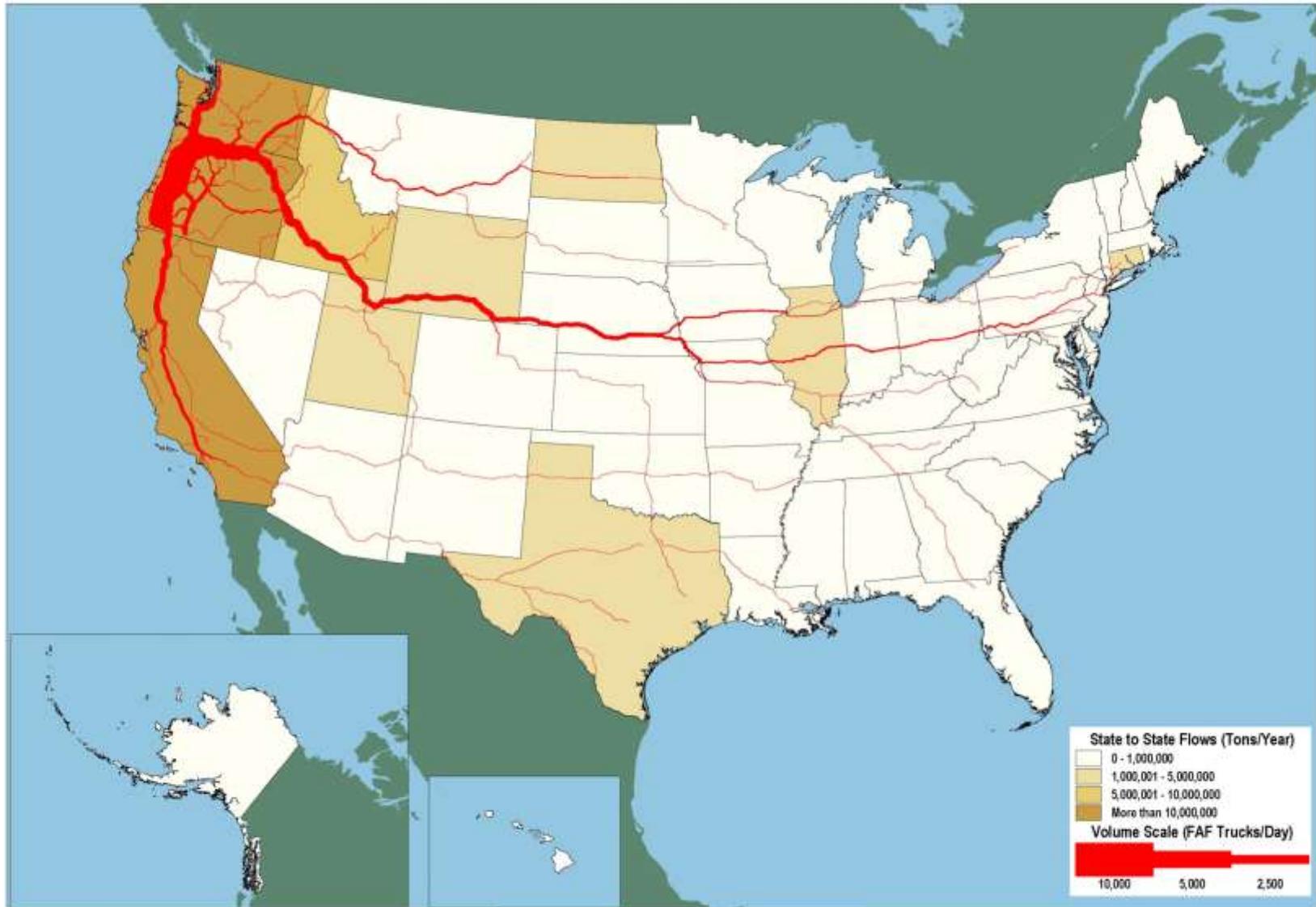
(0 – 30 Min)	(0 – 72 hrs)	(1 – 72 hrs)	(6 hrs – 30+ days)	(12 hrs – 30+ days)	(18 hrs – 30+ days)	(20 hrs – 7 days)	(1 – 30+ days)	(8 – 180+ days)
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- Massive staging areas are likely to be required in various areas of Central and Eastern Oregon with the primary location of relief supplies
 - Roberts Field Airport in Redmond, Oregon, Deschutes County.
- River traffic on the Columbia River will be an important response and recovery lifeline.



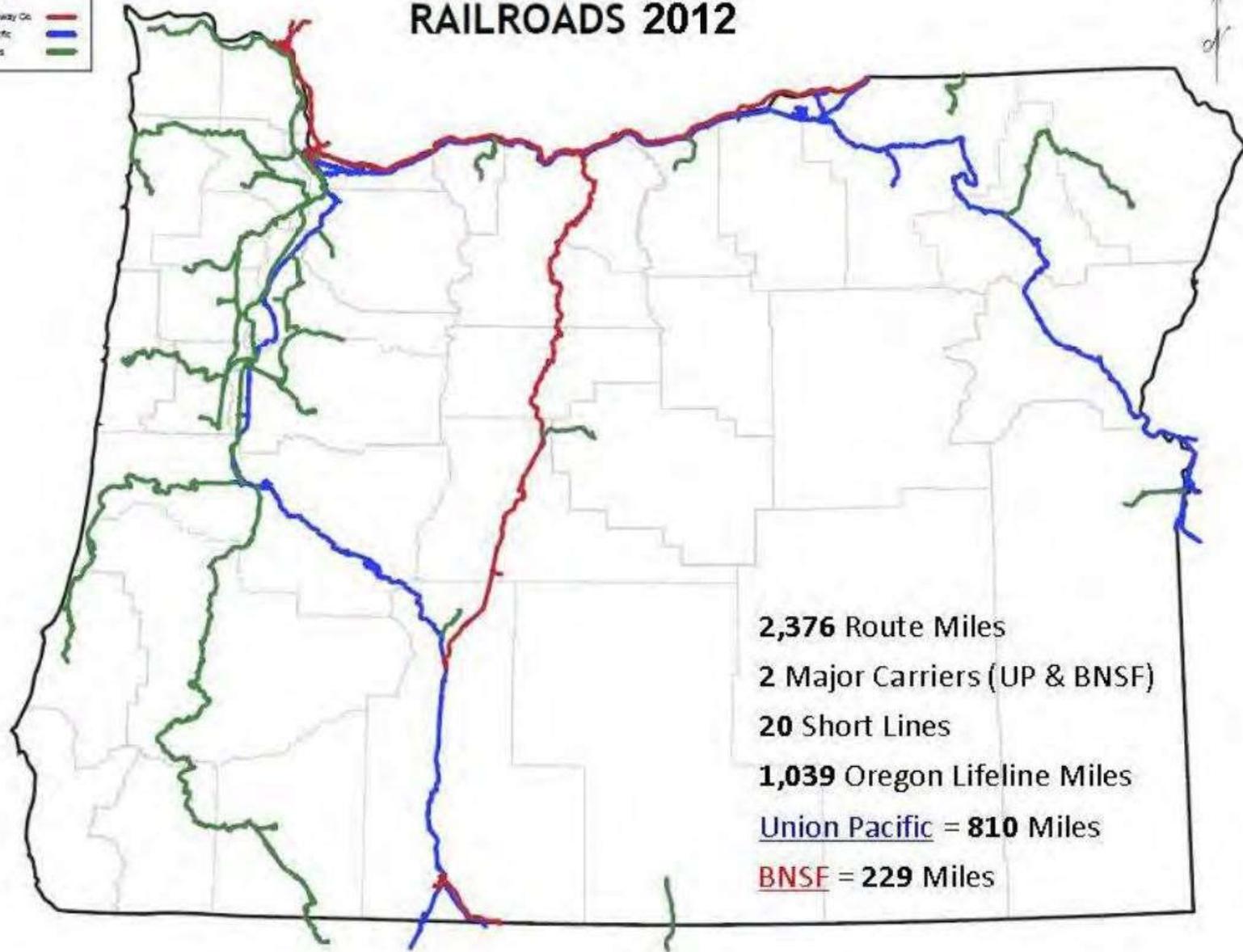
Major Flows by Truck To, From, and Within Oregon: 2007



Note: Major flows include domestic and international freight moving by truck on highway segments with more than twenty five FAF trucks per day and between places typically more than fifty miles apart.

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.1.2, 2011.

RAILROADS 2012



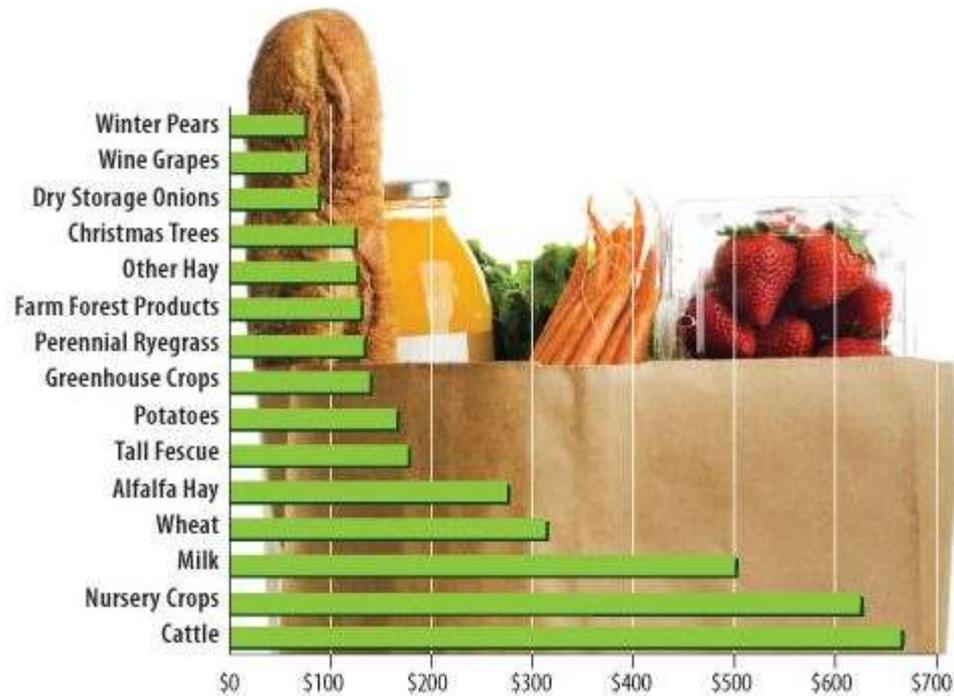
2,376 Route Miles
2 Major Carriers (UP & BNSF)
20 Short Lines
1,039 Oregon Lifeline Miles
Union Pacific = **810** Miles
BNSF = **229** Miles

- Mutual aid from Eastern Oregon local jurisdictions will be sought to the maximum degree possible.
- Many building inspectors, police, firefighters, medical personnel, engineers, and public works personnel may deploy to the impacted areas of Western Oregon



Impact on Economy

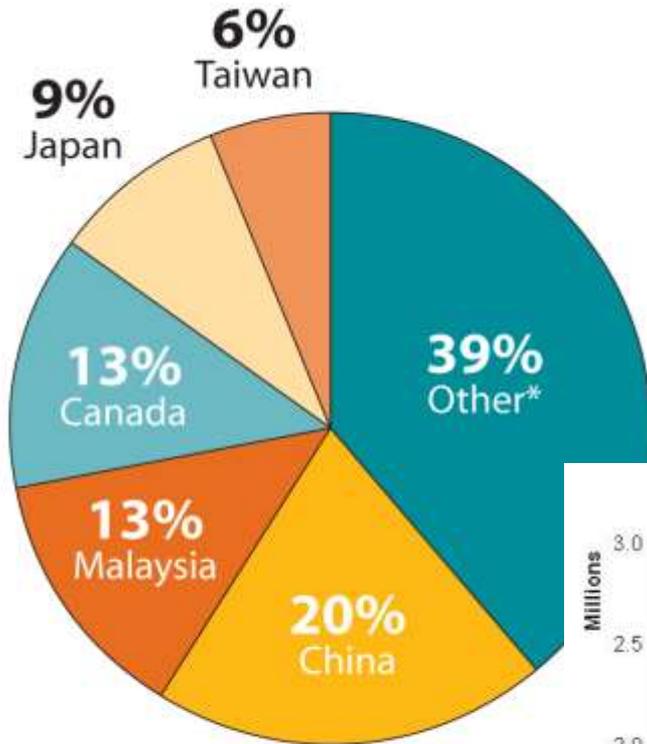
- Probably the longest lasting impact for Eastern Oregon



Oregon Farm Gate Sales (In Millions) 2008, OSU Extension Service



Top Oregon Exports Markets, 2009



* Other category includes more than 230 count the largest markets including South Korea, C, The Netherlands and Germany.

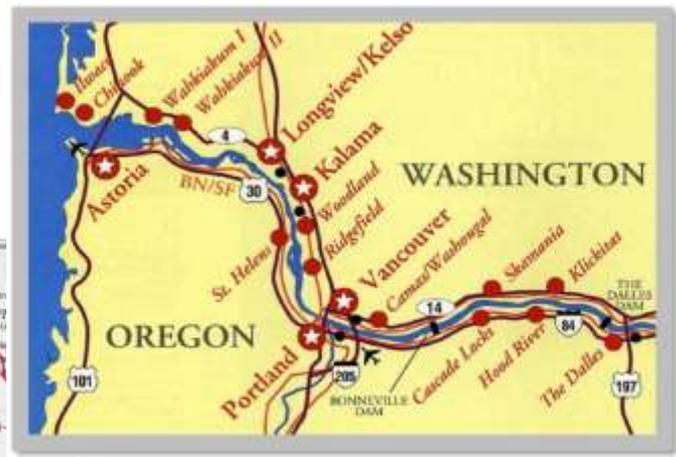
Port of Portland, Marine Tonnage





Exports

Imports



Contact Information

Geological Hazard
Program Coordinator

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