

The Three Things You Need to Know About Tsunami Preparedness

Patrick Corcoran, Oregon Sea Grant, 10.11.13



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The Bottom Line

- Giant Earthquakes Happen Here! They Occur Regularly in Geologic Time. Our Last One Was in 1700 (313 yrs)
- Given 10k year Averages, We are well within the Window of Recurrence (75% of M8-9 events would have happened by now given the historic record)
- We are the First Generation since western settlement to know of our risk. We need to become prepared *commensurate with the risk*
- First step: EXPECT IT! It will change your life.

The 3 Things You Need to Know

- The difference between “Local” and “Distant” tsunamis
- The location of “High Ground” are where you live, work, and play along the coast
- “How to Reconnect” with loved ones following Local events

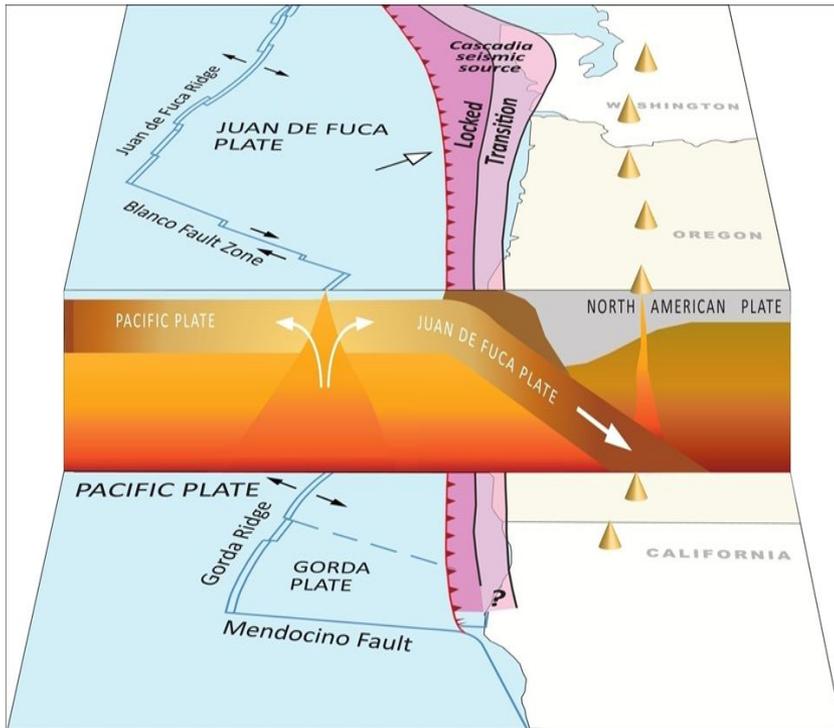
OSG Hazards Outreach Specialist

- Came for Weather/ Stay for the Tsunamis
- My focus: Earthquake + 30 minutes. Essential messages for regular people
- Balancing education and messaging. But trending toward more messaging. I want to change your behavior!

Education

vs.

Messaging



Greatest Challenges

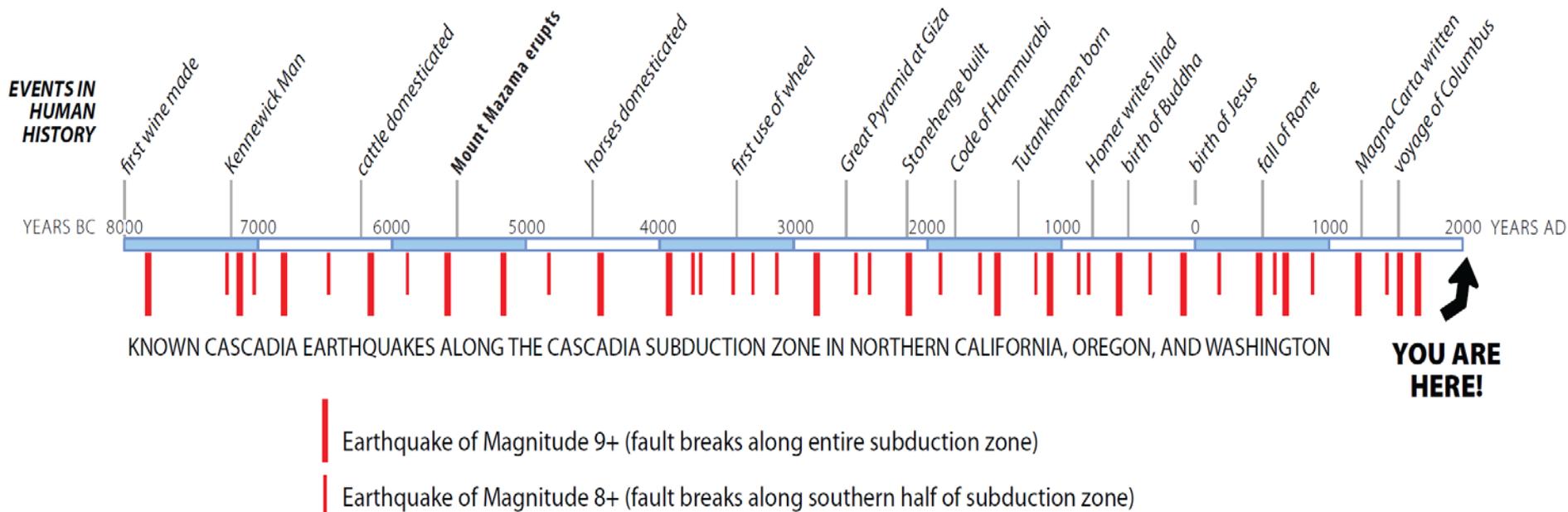
- Human risk perception. Human's are neurologically challenged to deal with this!
- Understanding probabilities and relative risks. We underestimate the likelihood of a destructive earthquake, and overestimate the likely scale of inundation
- We have no cultural context to guide our desired behavior. We are profoundly vulnerable, and don't even know it.
- Scientific consensus for Cascadia only 25+ years. We are the first generation since western settlement to know that we get giant earthquakes and tsunamis. Cultural resistance.

Greatest Opportunity!

- We are the first generation since western settlement to know that we get giant earthquakes and tsunamis!
- Can we change our behavior in alignment with what we KNOW will occur? Hmmmm

The First Step is to Expect it!

CASCADIA EARTHQUAKE TIME LINE



Comparison of the history of subduction zone earthquakes along the Cascadia Subduction Zone in northern California, Oregon, and Washington, with events from human history. Ages of earthquakes are derived from study and dating of submarine landslides triggered by the earthquakes. Earthquake data provided by Chris Goldfinger, Oregon State University; time line by Ian P. Madin, DOGAMI.



Source: 2010 issue of *Cascadia*

EXPECT IT!

It will change your life

30 year probabilities of selected hazards

USGS Press release 2008, adapted from "Earthquake Basics" DOGAMI 2013

<u>Outcome:</u>	30-year Probability of Occurrence
Being In A Car Accident	59.9%
50-year old Oregon Male Will Die	40.3%
50-year old Oregon Female Will Die	27.1%
At Least One 100-year Flood	26.0%
30-year old Oregon Male Will Die	10.8%
Magnitude 8-9 Cascadia Subduction Earthquake & Tsunami	10.0%
Your Vehicle Stolen	9.5%
30-year old Oregon Female Will Die	6.4%
You Are Robbed	3.0%
Have Residential Fire	1.2%
Killed In Car Accident	0.9%

* USGS Press Release April 14, 2008



Questions

- How many of you locked your car?
- Why?
- How many of you have a Go-Kit in your car?
- Why Not?

Are Dice More Your Thing?

Pick two numbers, and roll the dice. That's how likely it is to get a local event



37% probability in the next 50 years of a M8 or M9 is greater than a 1:3
Chris Goldfinger, OSU

EXPECT IT!

Then what?

The 3 Things You Need to Know

- The difference between “Local” and “Distant” tsunamis
- The location of “High Ground” are where you live, work, and play along the coast
- “How to Reconnect” with loved ones following Local events

Local Tsunamis

Created by a local earthquake



Distant Tsunamis

Caused by distant earthquake



Local Earthquake

- If you FEEL a large earthquake: immediately duck down, cover your head from falling debris, and hold on until the shaking stops.
- If you're in the inundation zone, evacuate immediately to high ground. If not, stay put, or moved to open ground.
- Avoid landslides, power lines, gas leaks, and fires. Administer first aid and help others. Expect aftershocks and related trauma and damage.
- Execute your family plan. What did you say you were going to do? Do your kids have the discipline to do it? Do you?

The Great Shake Out

- <http://www.shakeout.org/>
- Excellent preparation for the Big One
- Good excuse for reluctant supervisors
- Non structural improvements are easy

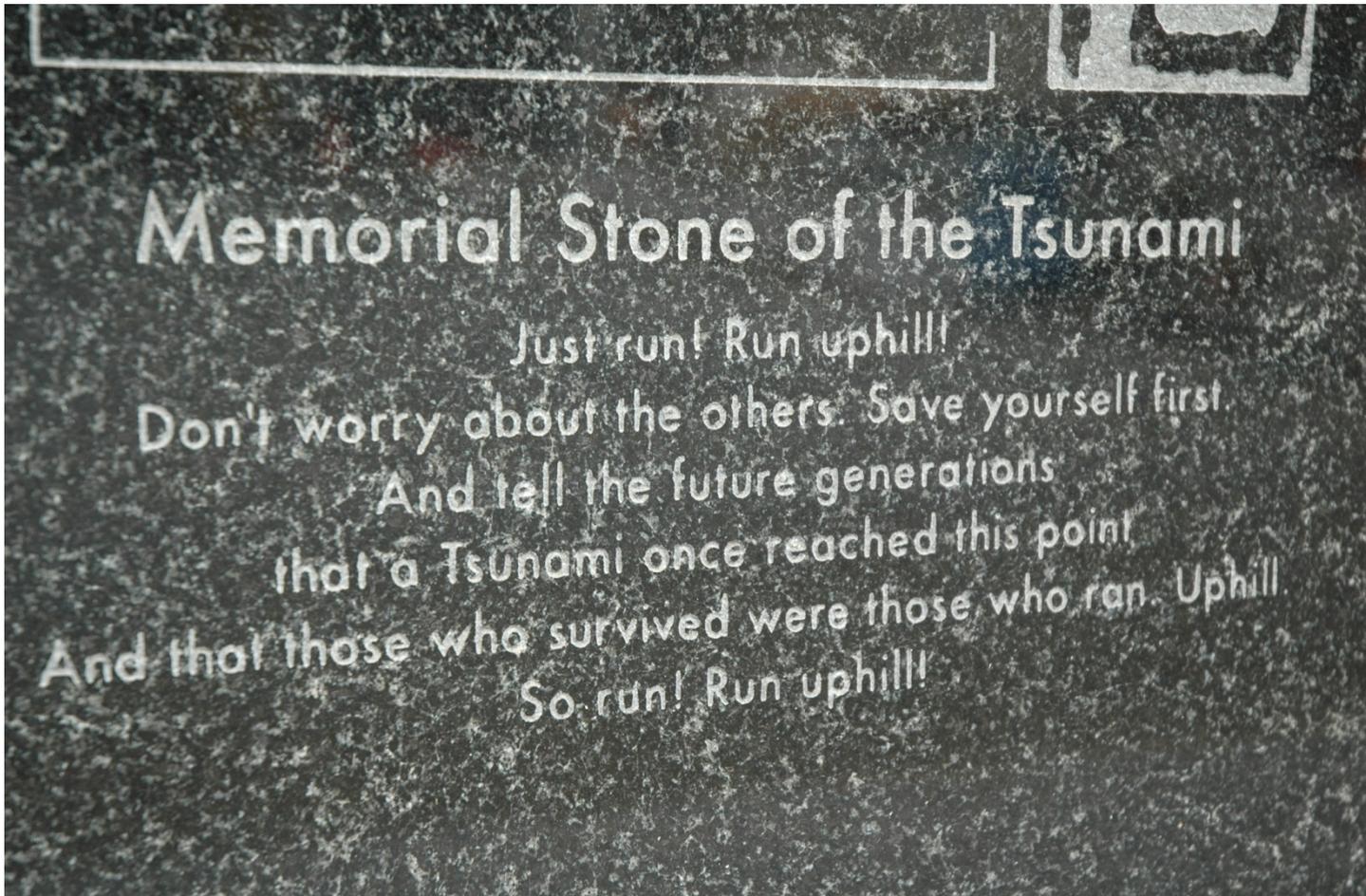
A large earthquake IS your warning
that tsunamis are on their way in
15 – 30 minutes!!



Local Tsunamis

- The areas vulnerable to flooding by tsunamis include all beaches, shorelines, coastal waterways, and wetlands. Much development and infrastructure exists in these areas.
- Map your lifestyle. Locate where you live, work, and play on inundation maps. “Know where to go” when the next Big One occurs. There will be no warning, you will have 15 – 30 minutes to get to high ground.
- Save yourself first

Run Uphill !



Where's High Ground?

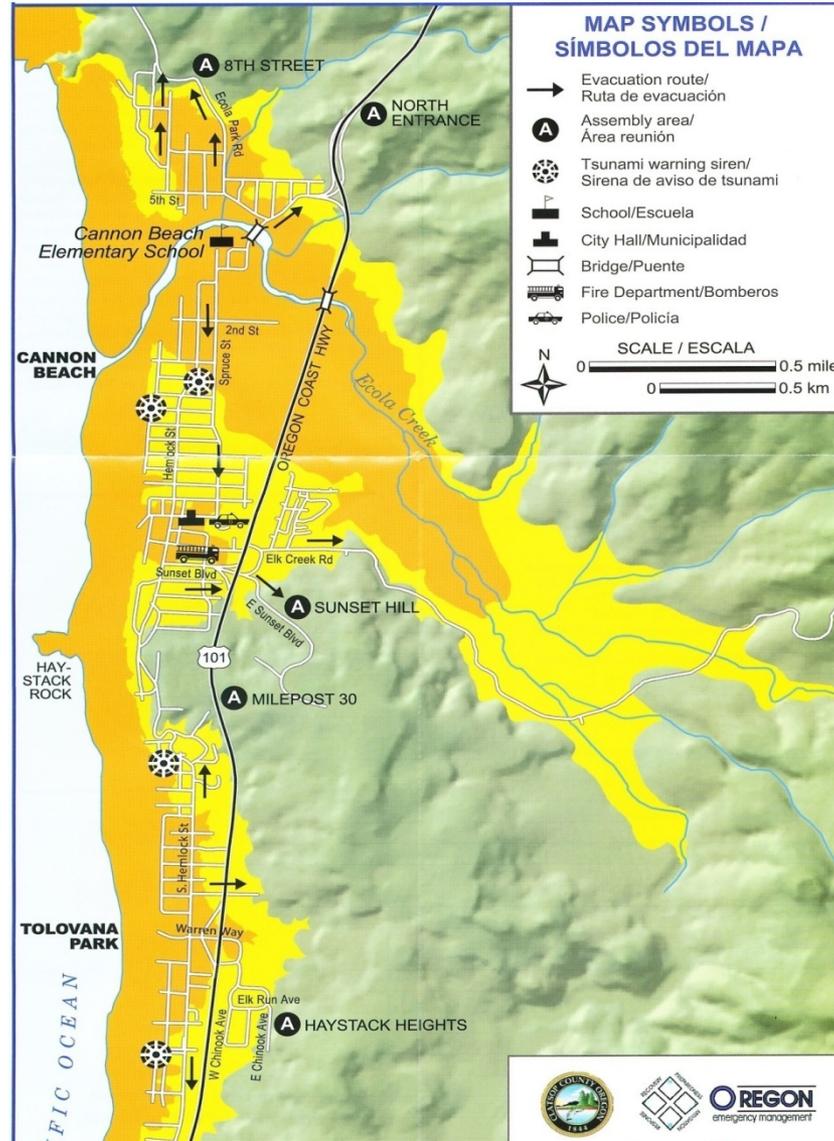
The New Maps (Oregon)

- May be the most significant cultural milestone since Lewis and Clark claimed “Ocian in View”
- Evacuation brochures and Tsunami inundation maps are different
- Map your lifestyle. Know where to go, bro!

New Maps !

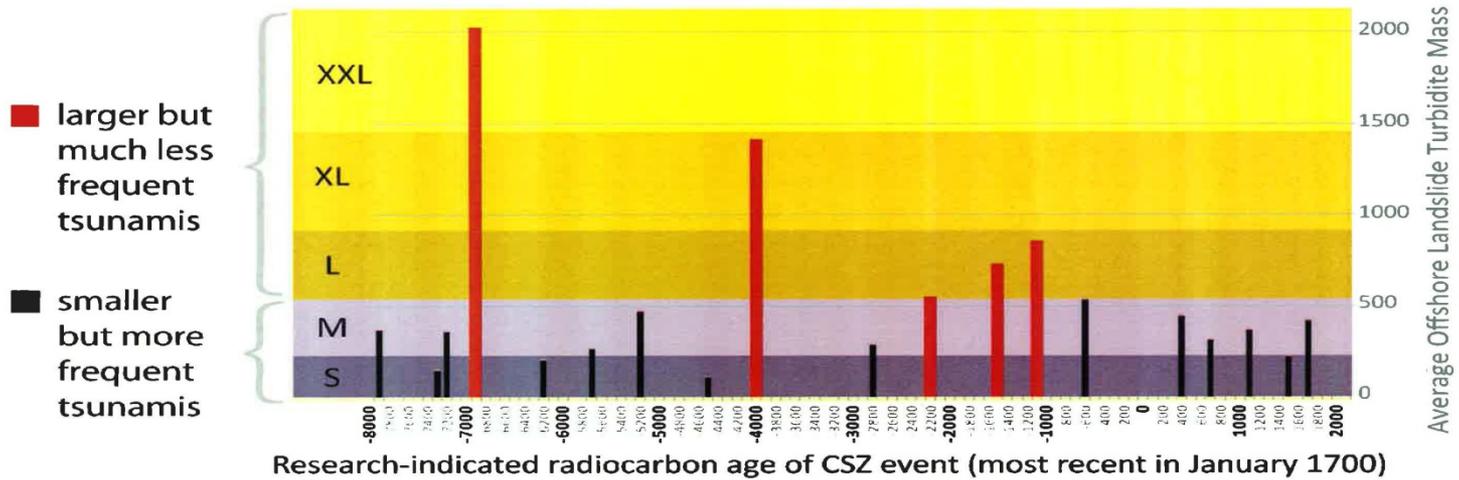
- DOGAMI Evacuation Brochures portray the worst case scenario for both local and distant events. Get maps at city halls, fire stations, and online at <http://www.oregongeology.org/tsuclearinghouse/>
- Tsunami inundation maps (TIM): Show range of the inundations of the past 19 events. More nuanced. For planning purposes.
- “Washington state tsunami maps”
http://www.emd.wa.gov/hazards/haz_tsunami.shtml#TsunamiEvacuationMaps
- <http://www.shakeout.org/washington/>
- Northern California / HSU: Redwood Coast Tsunami Work Group
<http://www.humboldt.edu/rctwg/>

Evacuation Brochures



19 M9's in past 10,000 years !

CASCADIA SUBDUCTION ZONE EARTHQUAKE/Tsunami EVENTS – PAST 10,000 YEARS



Source: Adapted from DOGAMI, 2013

Map Exercise

- Oregon Tsunami Clearinghouse
- Maps and Apps
- Google Earth

How Do I Reconnect With Family?

DISTANT event? Phones, roads and infrastructure may be busy, but intact. Drive home, call home, or stay overnight with friends.

- **LOCAL** event? Instruct loved ones to get to high ground, stay there overnight, and find each other the next day. ID a non-local contact person for everyone to call. Do not rush to meet at a designated place as that will likely require family to re-enter danger zones.
- Power and all phones will be out. Many roads and bridges will be damaged. You will likely not be in communication for a while. Insist that everyone knows what to do to be safe wherever they are. Don't re-enter inundation zones for 24 hours. Talk through these scenarios.

You Mean MY Dysfunctional Family?!



- Yes. Do your loved ones understand that we get this infrequent but real hazard? Do they Expect it?
- Will they take distant events in stride; but when the *earth quakes*, will they move to high ground, stay there overnight, and find you the next day? Are you sure?

Field Educators

- Understand your “tsunami footprint” and know where high ground is at all locations
- Carry a Go Bag in your work rig?
- Know who else are you responsible for. Colleagues, adults, kids? What are your responsibilities for their tsunami evacuation?
- Seek opportunities to educate colleagues and learners about our relative risk, and how to increase our preparedness
- Talk to your loved ones about “what if” scenarios with you working on the coast

Field Scenarios

- **Local**
 - Duck, cover, hold
 - Get you, and your people, to high ground
 - Stay safe overnight
 - Reconnect with loved ones
- **Distant**
 - Monitor media, avoid adding to confusion
 - Get your people back to their people
 - Avoid over-evacuation
 - Any other professional responsibility?

Overwhelming Opportunities



- Political leadership and government support
- Businesses and Chambers of Commerce
- Schools, hospitals and public health, educators
- Public works, ODOT, planning departments
- Individuals, families, and neighborhoods, CERTS.

We're Culturally Unprepared

- Research has only in the past 25+ years revealed that Cascadia erupts in Great (M9) earthquakes and tsunamis.
- It's understandable that we're behind the curve. But, we must make up for lost time. We must prepare commensurate with the risk—which is great.
- In Japan 2011, 20k people tragically died. But over 200k were in the inundation zone at the time. So, 90% of Japanese successfully evacuated!





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