

Catastrophic Earthquake Preparedness

An Audit by the Office of the
Auditor General of British Columbia

Emergency Preparedness & Business Continuity Conference 2014

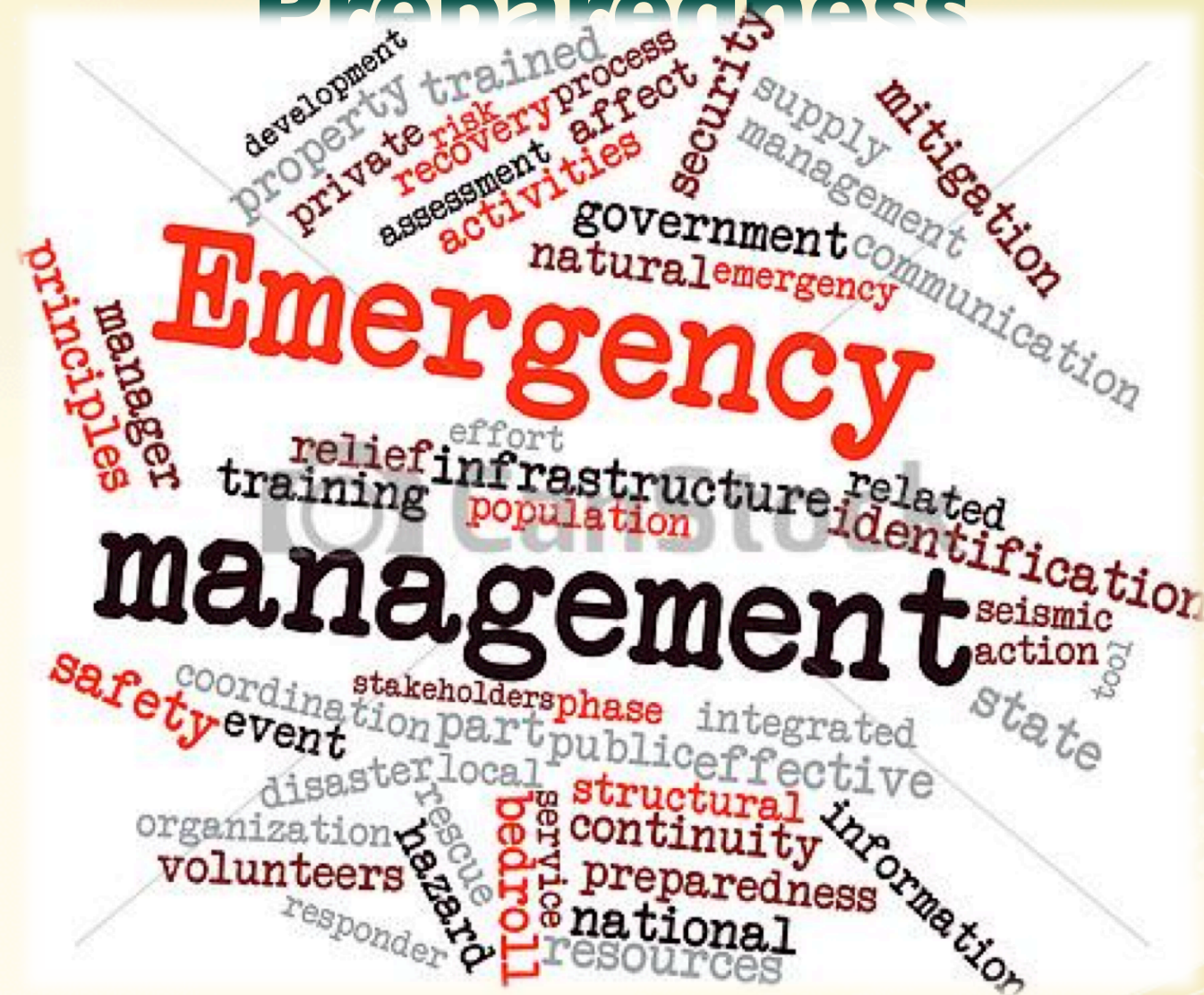
November 18, 2014

Russ Jones: Deputy Auditor General



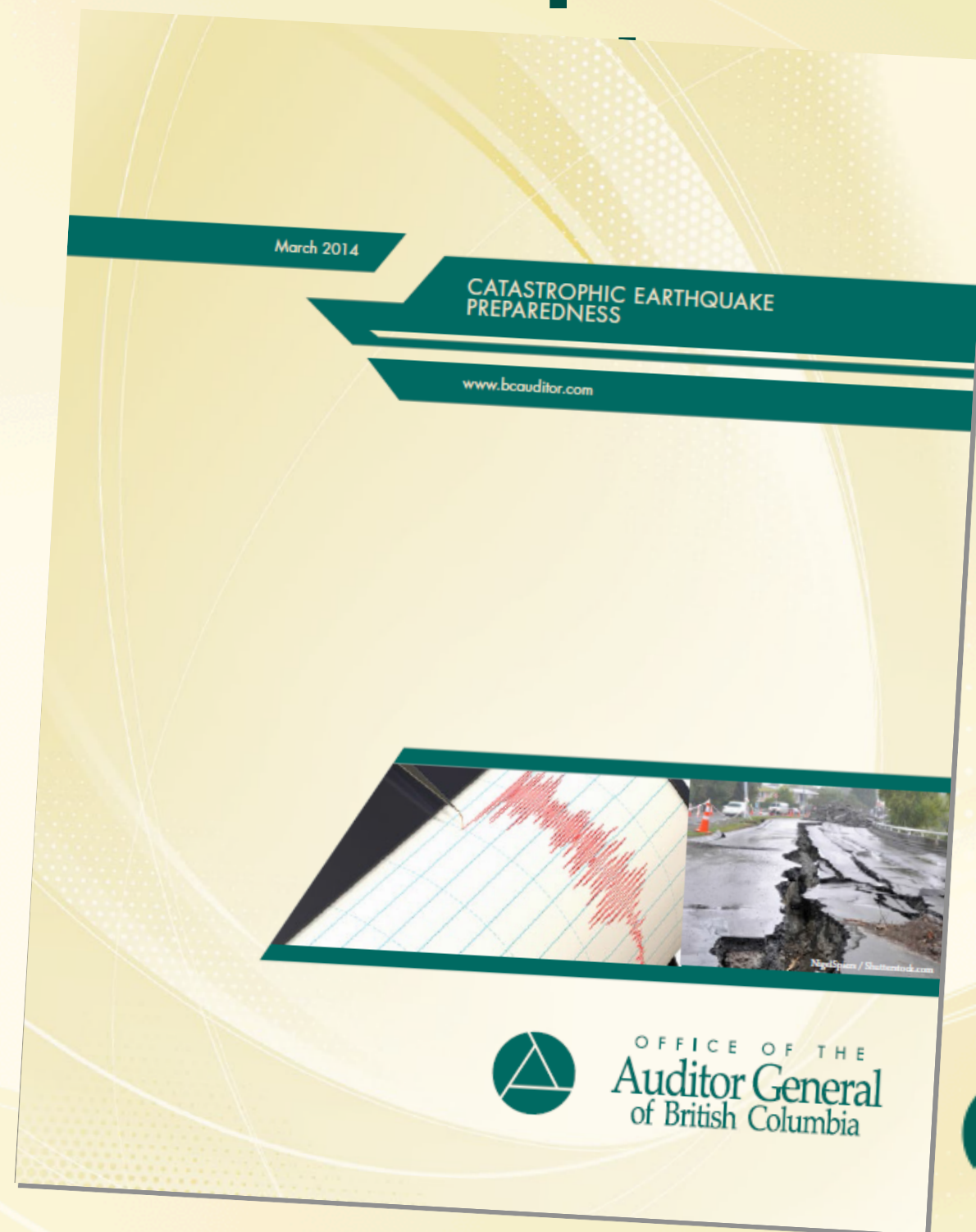
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Catastrophic Earthquake Preparedness



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Catastrophic Earthquake



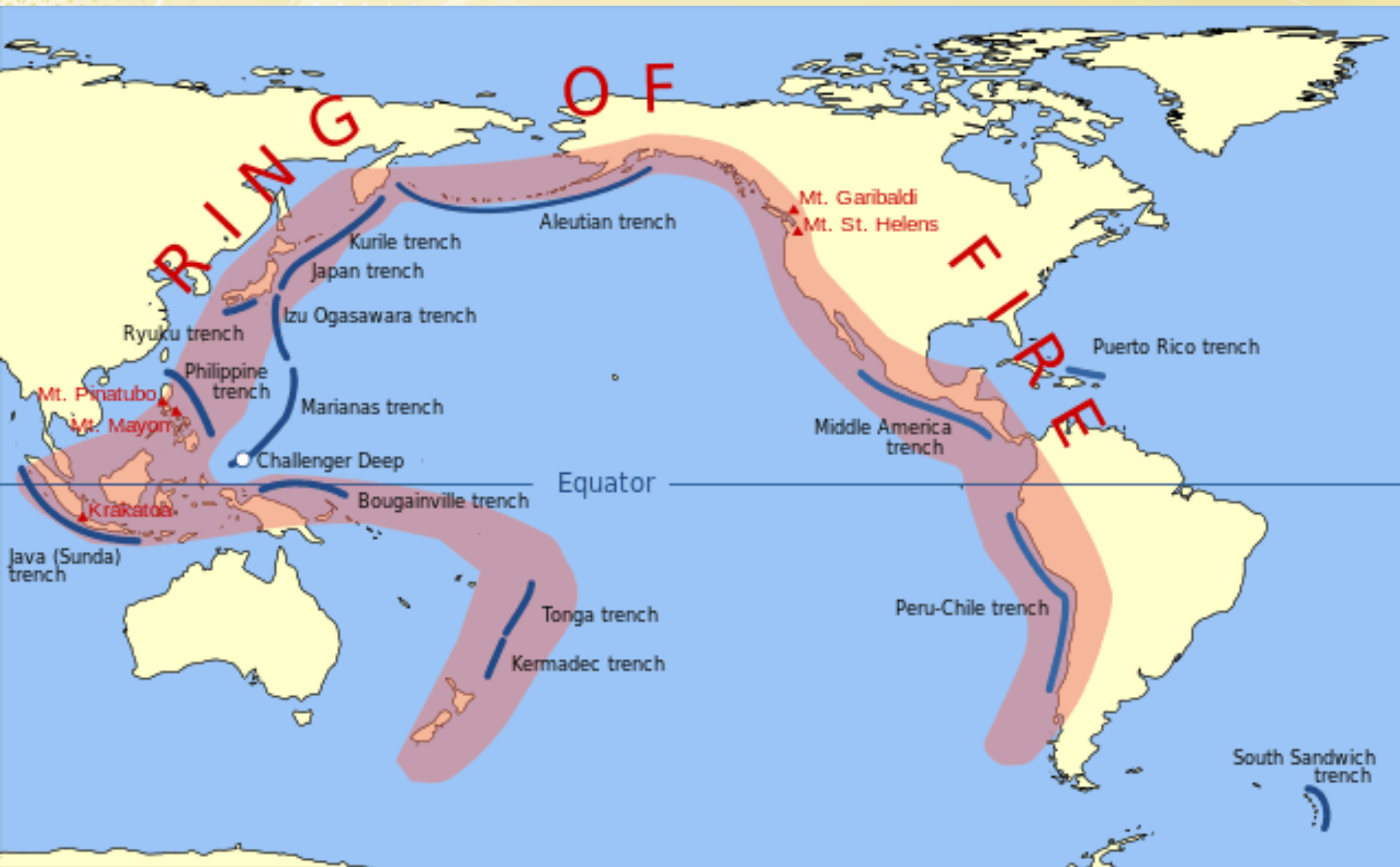
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Presentation Topics

- Earthquakes and earthquake risks
- Audit purpose
- Key audit findings and their causes
- Audit Recommendations
- Discussion (Q&A)



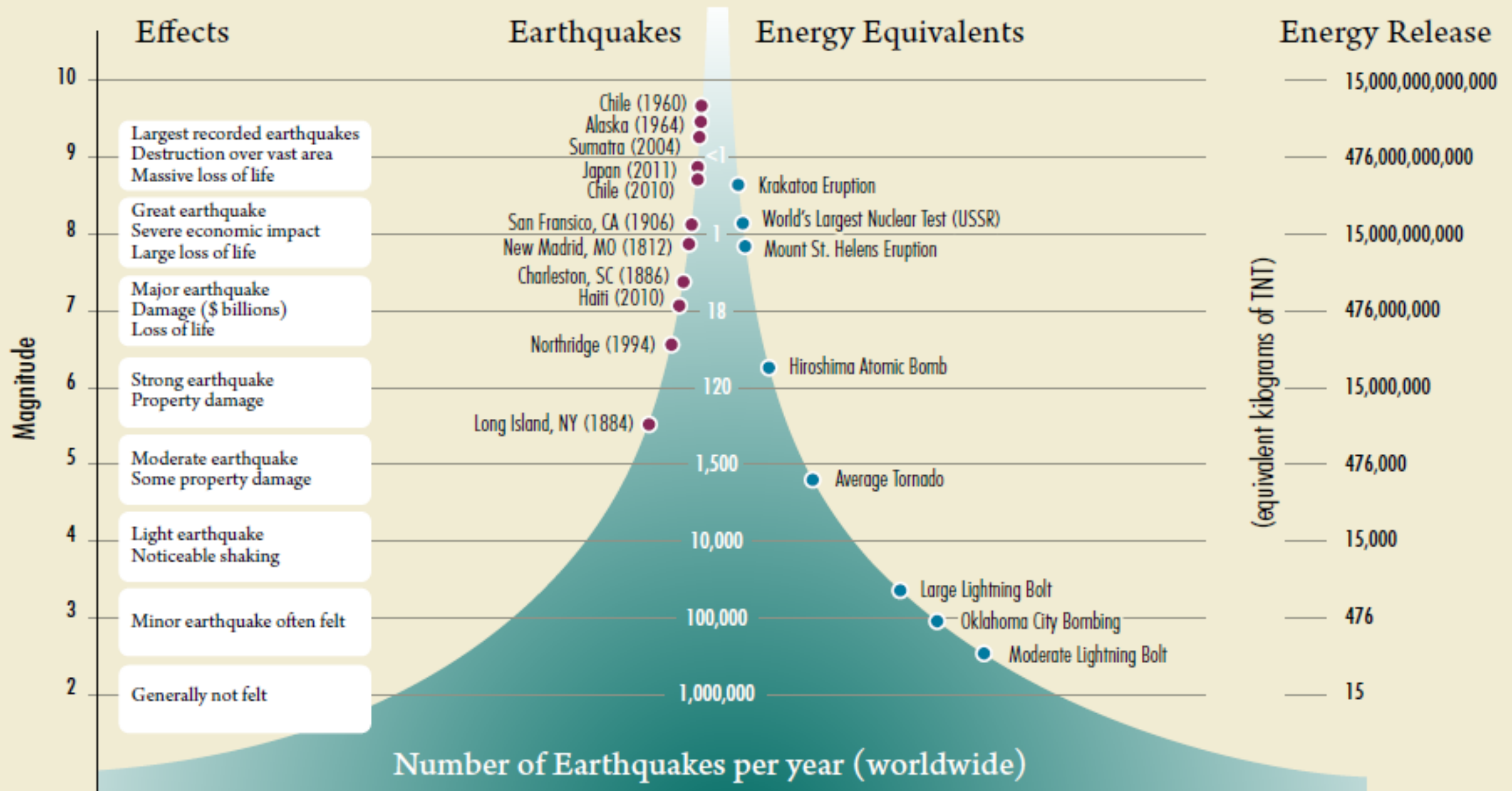
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Varying Strengths of Earthquakes

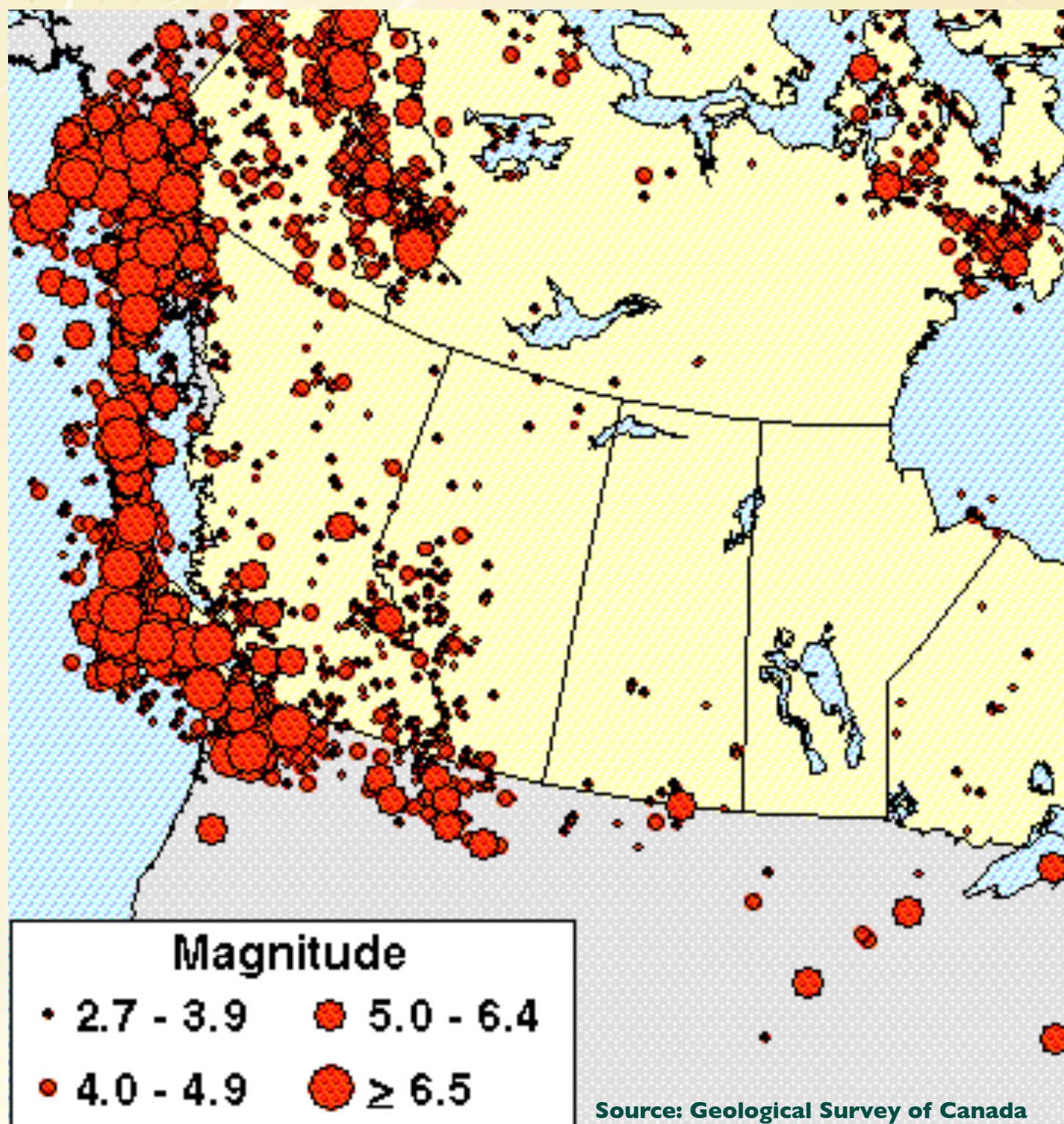
Category		Effects	Richter Scale
I.	Instrumental	Not felt	1-2
II.	Just Perceptible	Felt by only a few people on upper floors of tall buildings	3
III.	Slight	Felt by people lying down, seated on hard surfaces, or in the upper floors of tall buildings	3.5
IV.	Perceptible	Felt indoors by many, by few outside, and windows rattle	4
V.	Rather Strong	Generally felt by everyone; sleeping people may be awakened	4.5
VI.	Strong	Trees sway, chandeliers swing, bells ring, some damage from falling objects	5
VII.	Very Strong	General alarm; walls and plaster crack	5.5
VIII.	Destructive	Felt in moving vehicles; chimneys collapse; poorly constructed buildings seriously damaged	6
IX.	Ruinous	Some houses collapse; pipes break	6.5
X.	Disastrous	Obvious ground cracks; railroad tracks bent; some landslides on steep hills	7
XI.	Very Disastrous	Few buildings survive; bridges damaged or destroyed; all services interrupted (electrical, water, sewage, railroad); severe landslides	7.5
XII.	Catastrophic	Total destruction; objects thrown into the air; river courses and topography altered	8

Earthquake Energy Scale



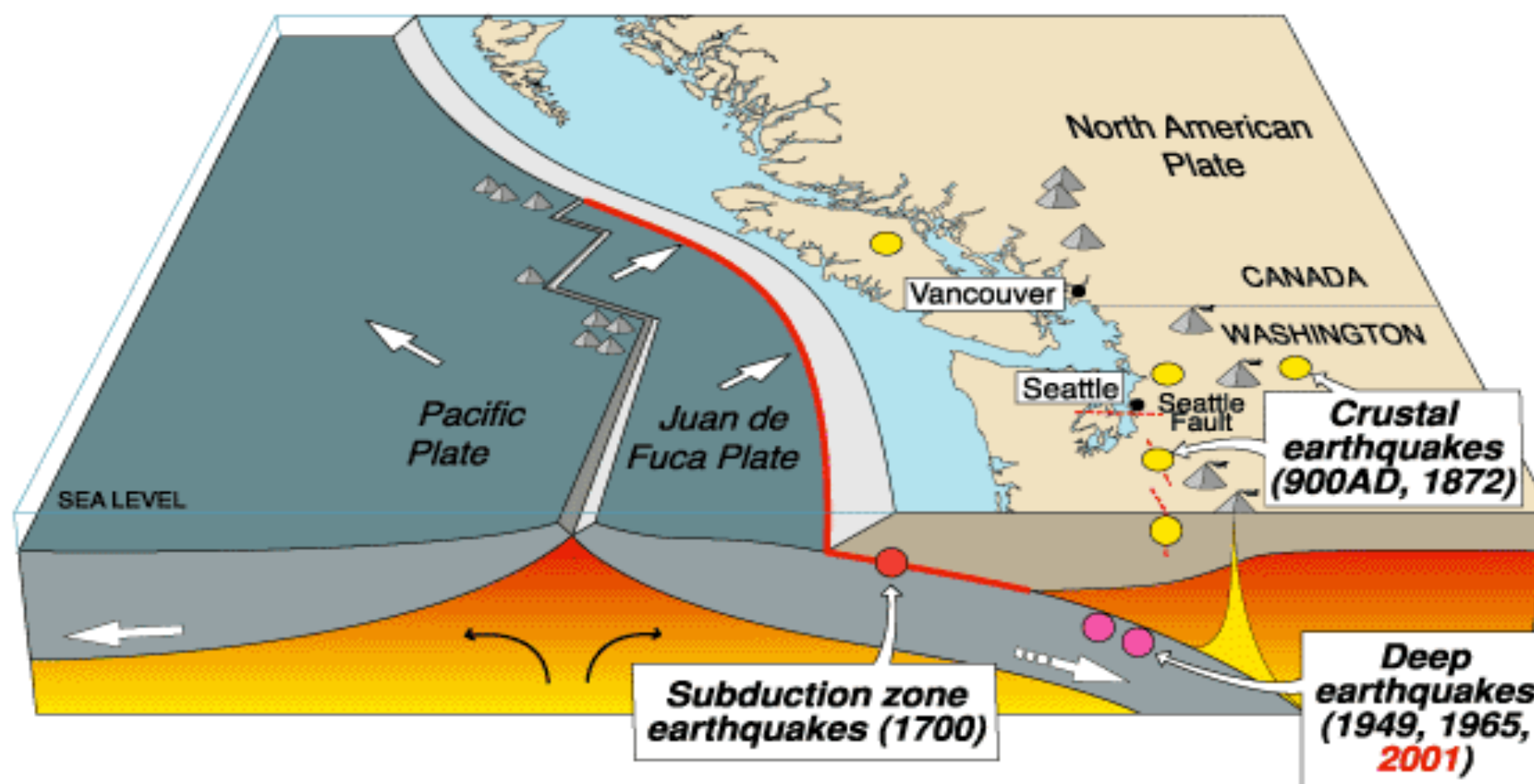
Source: Adapted from Incorporated Research Institutions for Seismology

BC's Seismic Activity



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BC's Earthquake Profile

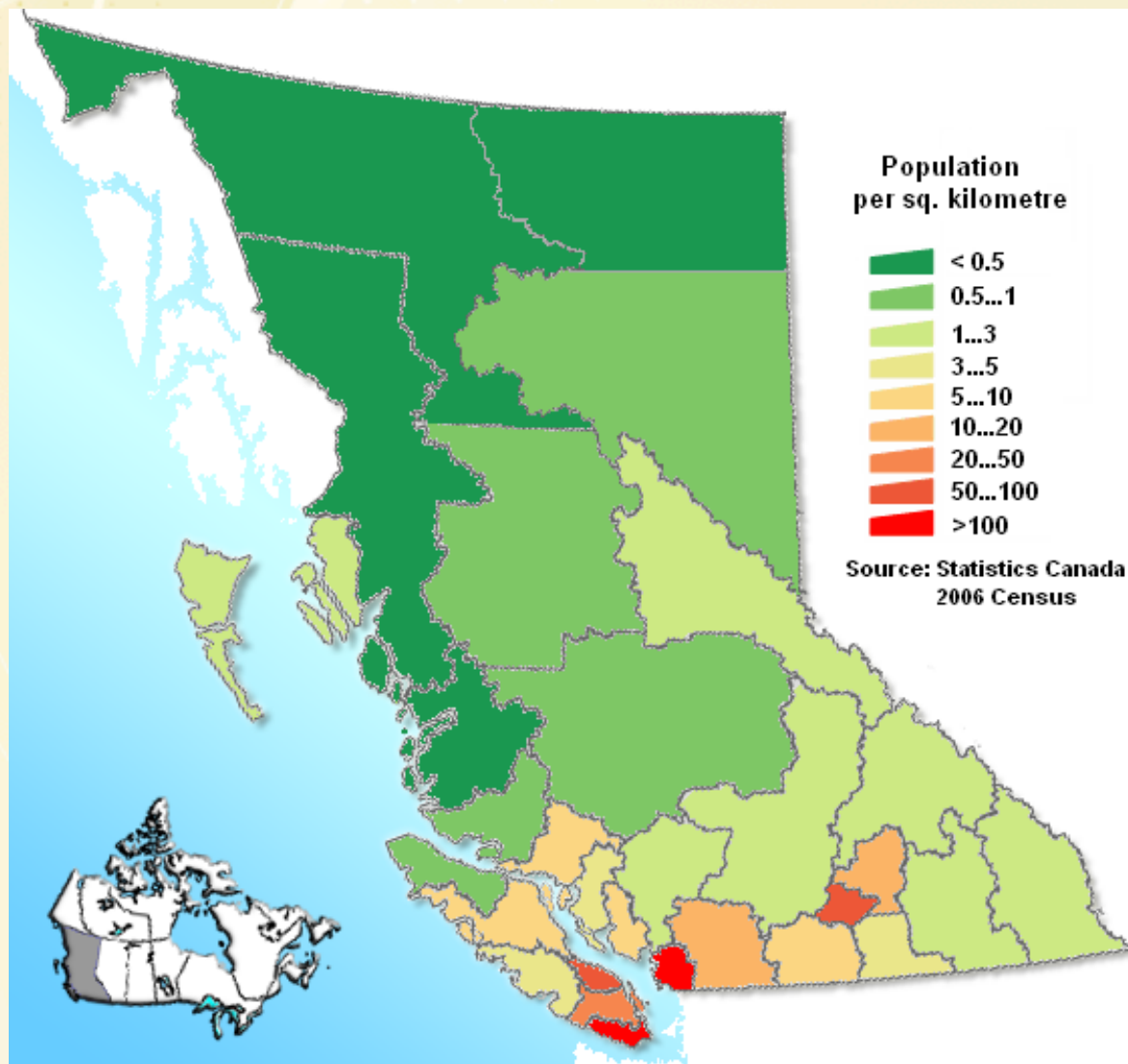


Source	Affected area	Max. Size	Recurrence
● Subduction Zone	W.WA, OR, CA	M 9	500-600 yr
● Deep Juan de Fuca plate	W.WA, OR,	M 7+	30-50 yr
● Crustal faults	WA, OR, CA	M 7+	Hundreds of yr?

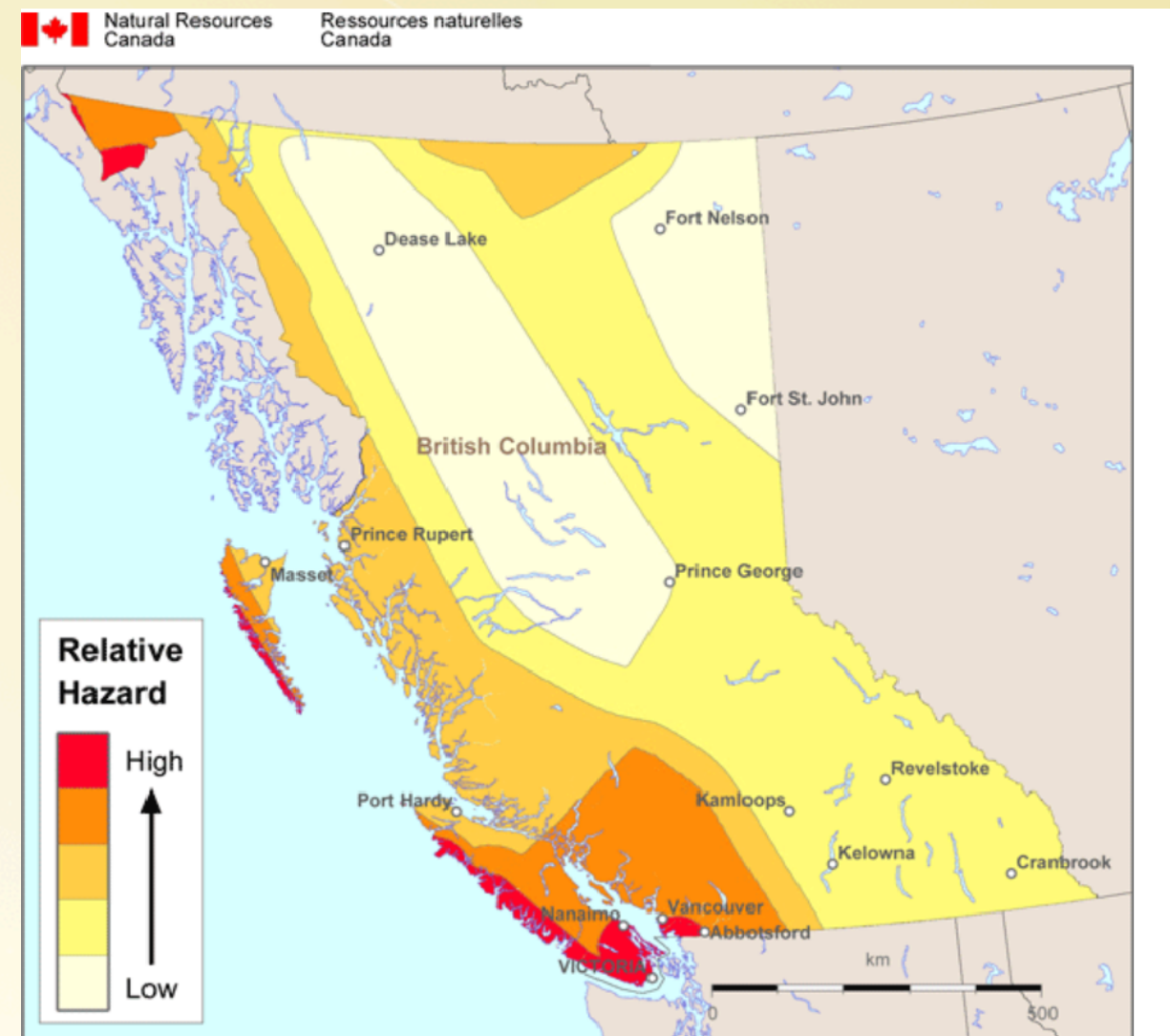
Source: US Geological Survey

BC Population and Hazard Zones

BC Population Density Map



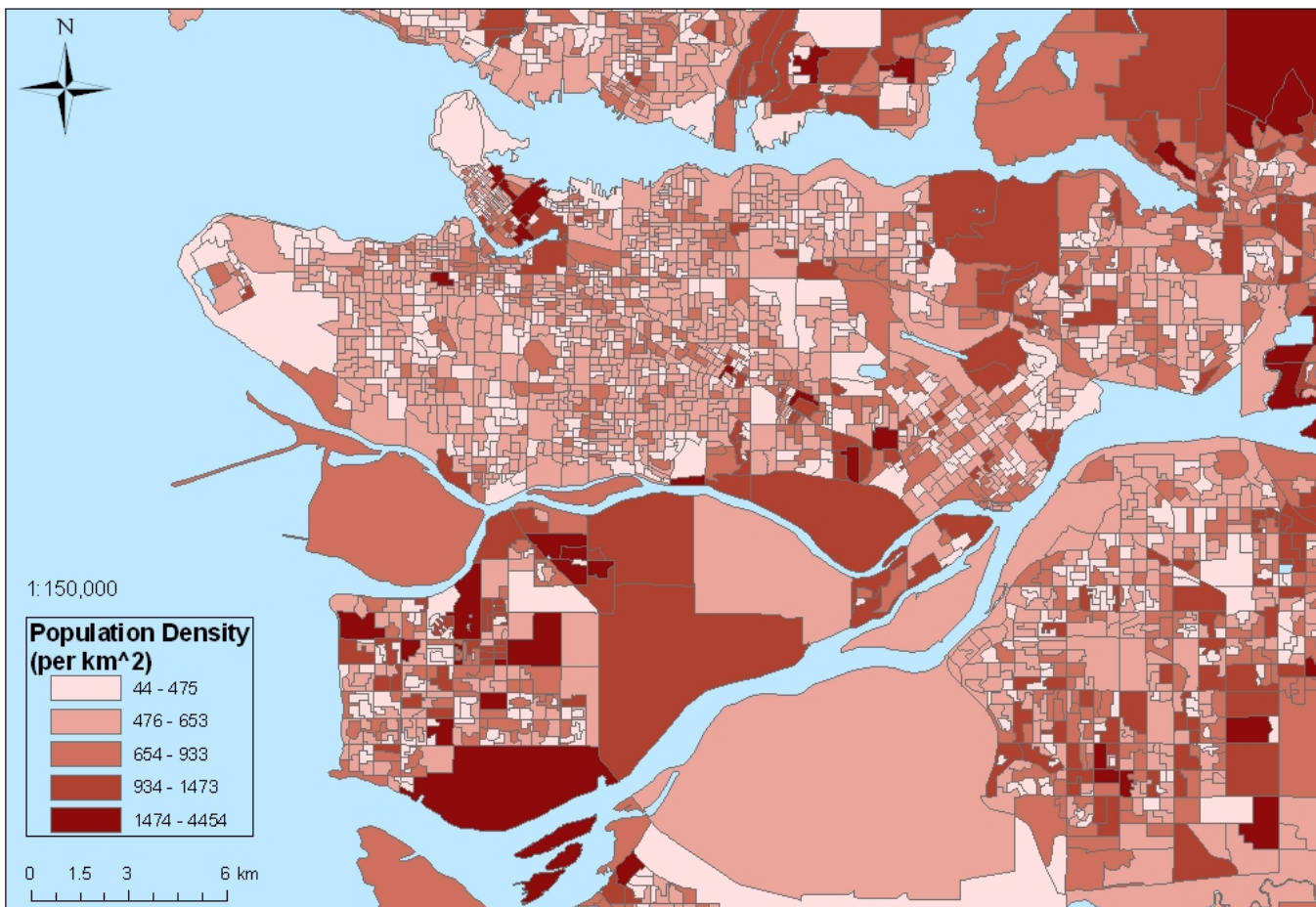
BC Earthquake Hazard Risk Map



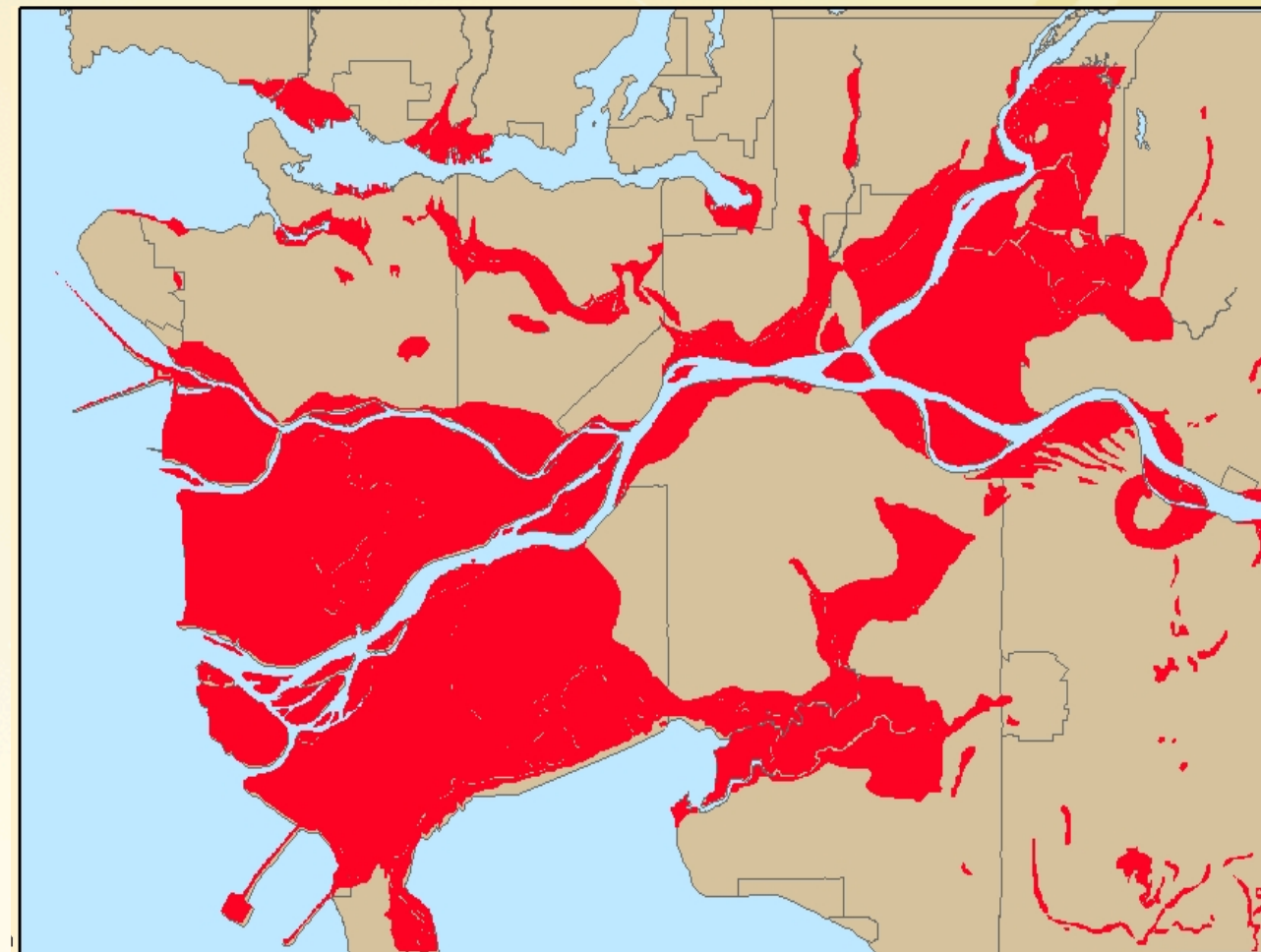
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Population and Risk

Population Density in Vancouver



Vancouver Liquefaction Hazard



GVRD: Liquefaction Hazard Map

Source: UBC Dept. of Geography:
- GVRD DEM Data, GVRD Boundaries
- Natural Resources Canada Geomap 2005
<http://gsc.nrcan.gc.ca>
Map Projection NAD 1983 UTM Zone 10N

Georgia Basin



Source: Environment Canada, 2013



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Introduction to Report



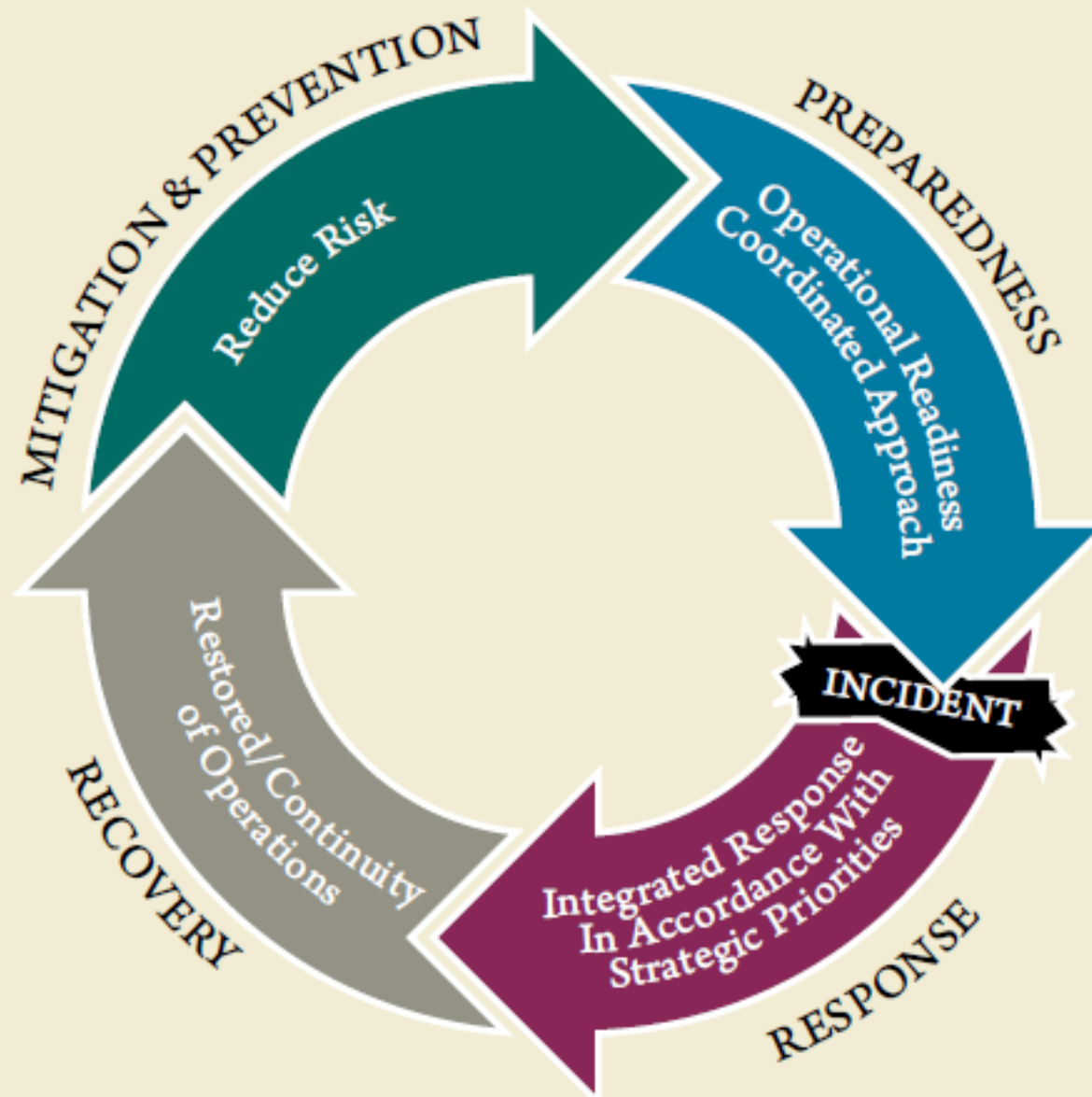
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Emergency Management BC



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Emergency Management – 4 Pillars



Source: Adapted from Public Safety Canada's Emergency Management Planning Guide



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Preparation is a Shared Responsibility

- Responsibility is shared between all stakeholders
- In BC, emergency management is based on escalating response model:



- The Provincial Government will need to take a strong leadership role in the event of a catastrophic earthquake



Purpose of the Audit

1. Can EMBC demonstrate that it is prepared to manage the effects of a catastrophic earthquake?
2. Is EMBC publicly reporting on the Province's preparedness for a catastrophic earthquake?



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Being Totally Prepared is Impossible

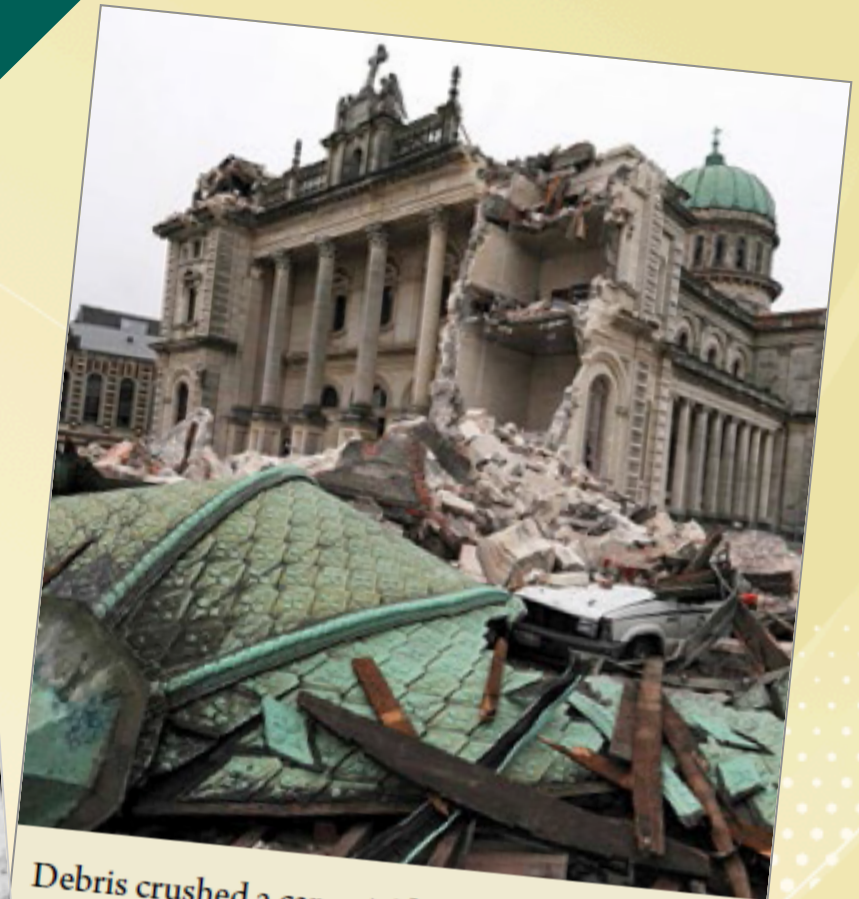


Despite Japan's investment of billions of dollars in earthquake and tsunami mitigation, preparedness, response and recovery, the scale of destruction during the March 11, 2011 tsunami quickly overwhelmed authorities.

Source: BBC News



Source: Iain McKain, Province files



Debris crushed a car outside the Christchurch Catholic Cathedral after a 6.3-magnitude earthquake hit Christchurch, New Zealand, Feb. 22, 2011.

Source: New Zealand Press Association



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Conclusions

- EMBC could not demonstrate that it is adequately prepared for a catastrophic earthquake
- EMBC was not reporting publicly on the Province's preparedness



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Conclusion: Not Adequately Prepared

Identified gaps and deficiencies in EMBC's plans and procedures included:

- Up-to-date hazard risk, vulnerability analysis
- Reflection of best practices
- Integration and coordination of others' plans and procedures
- Monitoring of stakeholder readiness
- Training and exercises
- Education of the public



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Conclusion: Not Publically Reporting

Public reporting allows individuals, organizations, and local and federal governments to make informed decisions on what they need to do to be prepared.



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Causal Analysis

- Catastrophic earthquake planning has not been made a priority by government



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Causal Analysis Continued...

“We are working very hard to build up our emergency preparedness. For us, it’s not just flooding. It’s potential for a tsunami on the coast, the potential for an earthquake. British Columbians need to know that their government is going to be there to protect them. I’m absolutely determined to make sure we are there in a time of crisis when and if it comes to our province.”

– Premier Christy Clark

Source: Global News interview June 25, 2013

“I can reassure British Columbians that our government is committed to providing a world-class public safety response.”

– Former Minister of Justice and Attorney General Shirley Bond

Source: Ministry of Justice Press Release November 12, 2012



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Causal Analysis Continued...

- Catastrophic earthquake planning has not been made a priority by EMBC
- Opportunities for more rigorous management framework (Managing for Results)



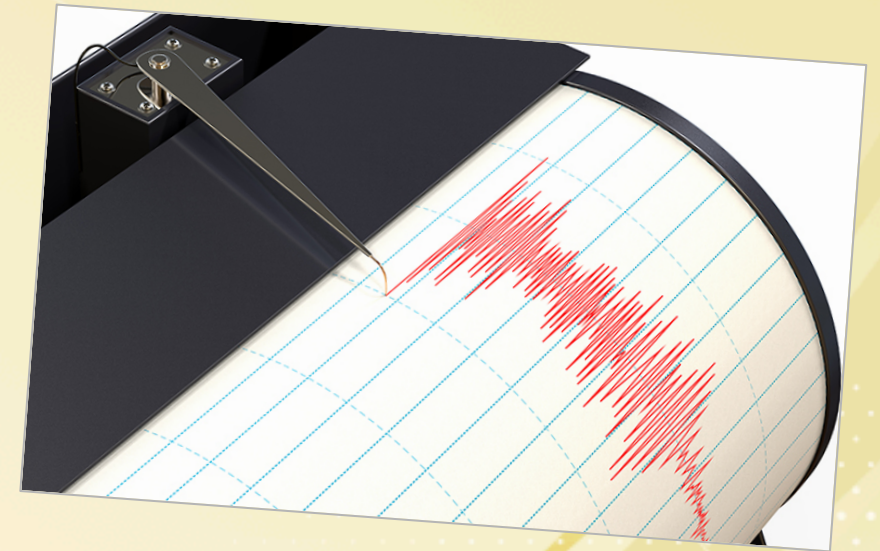
SOURCE: ADAPTED FROM W.E. DEMING APPROACH



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Causal Analysis Continued...

- Legislated authorities
- Incomplete implementation of previous recommendations



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Recommendations (paraphrased)

Government

1. Develop long term goals/targets
2. Ensure EMBC has necessary capacity

EMBC

3. Develop plan to achieve government goals
4. Prioritize efforts to achieve mandate
5. Review to identify and address gaps
6. Evaluate stakeholder readiness and capacity
7. Conduct regular exercises
8. Measure effect of public awareness campaign
9. Report annually on state of readiness



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Questions/Comments?

