



Vancouver—Waiting for the Big One

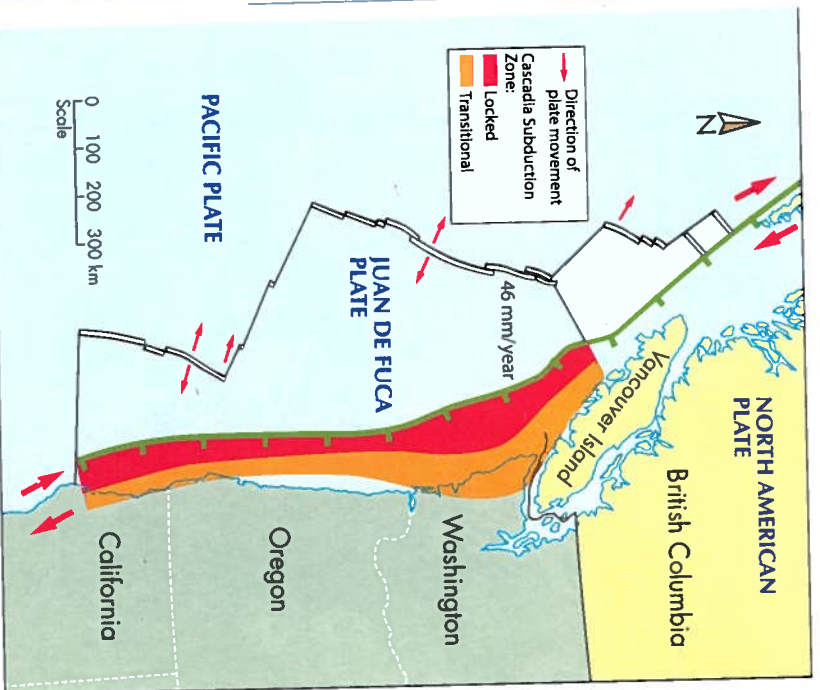
No one can predict when or where it will hit, but the experts worry that southwestern British Columbia is overdue for a big earthquake. Although it has been over 60 years since the region's last major quake—north of Courtenay in 1946—Vancouver sits amid Canada's most active earthquake zone.

A schoolroom in Courtenay, Vancouver Island, BC in 1946, after an earthquake that registered 7.3 on the Richter scale. Since then, earthquake pressure has been building on the island.

through a major tremor that collapses chimneys, cracks walls, empties shelves, and triggers landslides. Once every 500 years or so, this region suffers a “megathrust” quake (magnitude 8.5+), accompanied by 10- to 20-metre movements along a major fault line, landslides, and tsunamis on the coast.

The instability originates in the Cascadia Subduction Zone, a 1200-kilometre fault line that runs southward from Vancouver Island to northern California (see map). Along this line, three tectonic plates—the North American Plate, the Pacific Plate, and the smaller Juan de Fuca Plate—join together. The floor of the Pacific Ocean is moving eastward at a rate of 4.6 centimetres a year and is subducting (sliding beneath) the continent of North America, which is moving westward. Research in recent decades has found evidence that this normal motion is presently “stuck.” When it is released, somewhere along the subducting zone, there is potential for disaster.

The National Earthquake Support Plan (NESP), which has reported on the region's earthquake preparedness, predicts two possible scenarios for Vancouver. The first, and more likely, is a moderately strong quake (6 to 7 on the Richter scale). The second, and less likely, scenario is a subduction earthquake measuring 8.5 on the Richter scale in the Lower Mainland, which would produce severe destruction within 100 kilometres of the epicentre. Many buildings would topple. Liquefaction would likely damage the airport, the Fraser Valley dikes, the Massey Tunnel, and bridge supports sunk into loose valley soils. The western Fraser Valley would flood. Up to 45 percent of Vancouver's schools would suffer moderate to total



The Cascadia Subduction Zone

collapse. Tsunamis and underwater slumpage would damage shoreline facilities, causing chemical spills, fires, and mass evacuations. The death toll would be in the thousands.

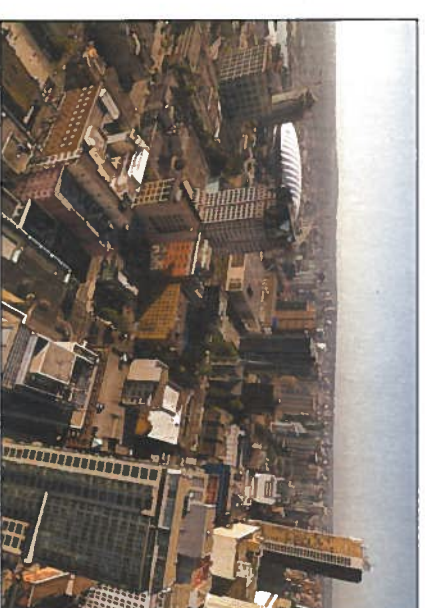
Recent quakes along the west coast of North America have prompted a series of government initiatives in British Columbia. A new emergency response plan now links a dozen different teams of experts, including the heavy rescue group, damage assessment engineers, firefighters, communications experts, hazardous materials specialists, and counselling psychologists, into a network prepared to act quickly in the event of a calamity.

Because prevention is as important as preparedness, a large number of seismic-upgrading projects in the region have been completed or are under way. The Cleveland Dam in North Vancouver was brought up to the strictest seismic code in 1992. The Vancouver School Board is completing a massive upgrading of the city's 100 oldest school buildings. A new \$10-million, seismically safe Emergency Operations Centre for Vancouver and adjacent communities, which opened in 2003, will coordinate disaster relief efforts. A new system of three saltwater pumping stations and earthquake-resistant piping was constructed on the edge of Vancouver's downtown core. This will serve as a back-up in case water mains and gas lines break and fires erupt. Businesses, especially those that transport hazardous materials, have spent millions to secure their facilities.

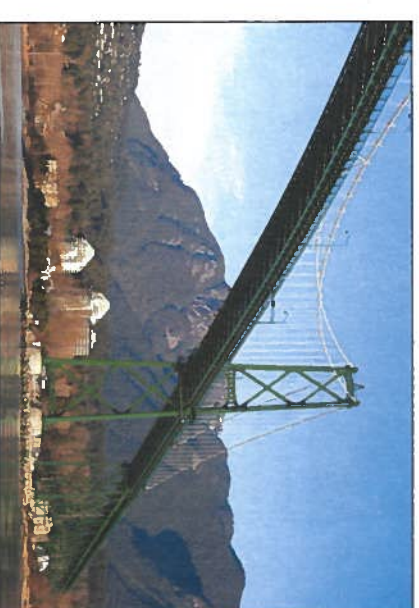
—Adapted from Daniel Wood, “Waiting for the Big One,” *The Greater Vancouver Book: An Urban Encyclopedia*, edited by Chuck Davis. Vancouver: Linkman Press, 1997.

THINK IT THROUGH

1. What two scenarios do researchers forecast for Vancouver?
2. Describe the geology responsible for the instability in the area.
3. How is a subduction earthquake, like the one that struck Courtenay, British Columbia, different from earthquakes that occur along the San Andreas Fault?
4. What impact might the “big one” have on the economy of Vancouver and its surrounding communities?
5. Imagine that your community was susceptible to a large and devastating earthquake in the not-so-distant future. If you were in charge of the emergency plan, list 10 priorities you would enact to protect local citizens.
6. Investigate the incidence of earthquakes in the region. On a map of British Columbia, plot the epicentre of the five most recent, and the five most powerful, earthquakes in the region. How does this pattern correspond to the map of the Cascadia Subduction Zone (Spotlight, page 130)?



The chance of a large subduction earthquake hitting Vancouver is remote, but possible.



While the majority of Vancouver's bridges have been reinforced against earthquakes, Lions Gate Bridge remains vulnerable.