

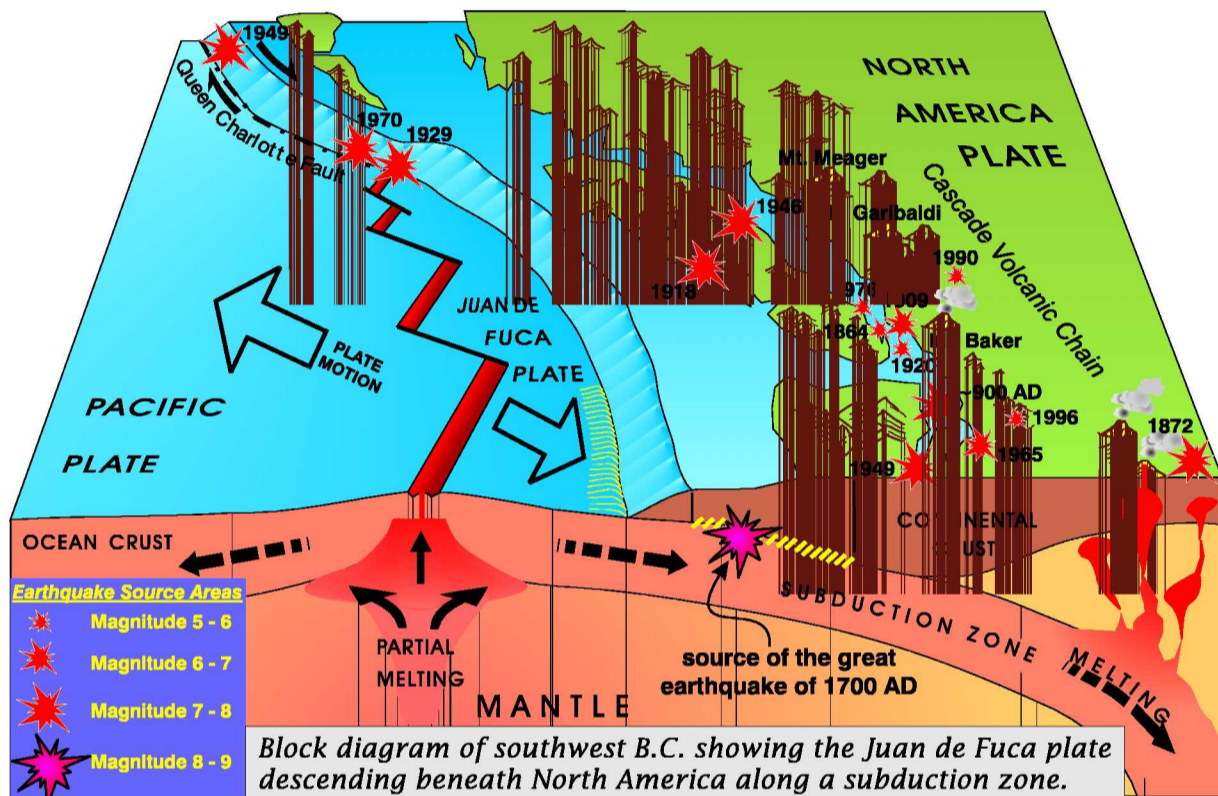
# EARTHQUAKE !! ON SHAKY GROUND

## Plates & Quakes

An earthquake is the result of a sudden release of energy when rocks under stress slide abruptly past one another along a break in the Earth's crust (fault). Most earthquakes occur where the large rigid plates that make up the outer shell of the Earth are in contact with one another.

## Where Earthquakes Happen

There is an average of one earthquake in southwest B.C. every day. Nearly all are too small to be felt, but a damaging earthquake occurs somewhere in the region about once every 20 years. The largest earthquake in this century was a magnitude 7.3 event in 1946, centred beneath central Vancouver Island. Were this earthquake to occur today under Vancouver, damage would be in the billions of dollars. Recently, scientists have recognized a history of infrequent, but great (magnitude 8 to 9) earthquakes on the fault separating the subducting Juan de Fuca and North America plates. The last great earthquake in 1700 AD affected the entire coast from northern California to southern B.C.



## Quake Damage

The effect of an earthquake includes ground shaking, landslides, and liquefaction (change of sediment from a solid to a quicksand-like liquid state). Earthquakes are most destructive when they are centered near cities, but the damage can differ considerably from site to site because of local geological conditions. For example, shaking on loose sediment is likely to be greater than shaking on bedrock. Some earthquakes trigger destructive sea waves (tsunamis) that can surge hundreds of metres inland, have heights of 10 m or more, and cause loss of life and severe property damage. In southwest B.C., the tsunami threat is greatest on the outer coast of Vancouver Island.

Earthquakes cannot be prevented. However, the damage they cause can be reduced through geological and geophysical studies that contribute to proper design of buildings and other structures, emergency planning, and public education. Geological mapping can identify areas of possible severe ground shaking, liquefaction, or landslides.

## Earthquakes Felt In Vancouver

- ~1700 AD, west of Vancouver Island, magnitude 8+ (great earthquake; native villages destroyed)
- Dec. 15, 1872, north-central Washington, magnitude 7.4 (felt strongly on the Lower Mainland)
- Jan. 11, 1909, San Juan Islands, magnitude 6 (felt strongly in Lower Mainland)
- Dec. 6, 1918, Vancouver Island., magnitude 7 (damage on west coast of Vancouver Island)
- Jan. 24, 1920, San Juan Islands, magnitude 5.5 (felt strongly in the Lower Mainland)
- June 23, 1946, Vancouver Island, magnitude 7.3 (much damage on central Vancouver Island)
- April 13, 1949, Puget Lowland, magnitude 7 (much damage in Seattle and Tacoma)
- April 29, 1965, Puget Lowland, magnitude 6.5 (much damage in Seattle)
- Nov. 30, 1975, Strait of Georgia, magnitude 4.9 (many aftershocks)
- May 16, 1976, southern Gulf Islands, magnitude 5.4
- April 14, 1990, Fraser Lowland, magnitude 4.9 (many aftershocks)
- May 3, 1996, east of Seattle, magnitude 5.5 (felt in the Lower Mainland)



Geoscape Vancouver  
Thematic Poster Series  
Geological Survey of Canada  
Open File 3353A, 1996  
Produced by:



BCAA  
Environment



Contributors:  
Natural Resources Canada, Geological Survey of Canada; J.J. Clague, S.G. Evans, B.J. Groulx, C.J. Hickson, L.E. Jackson, Jr., J.M. Journeay, J.L. Lutenauer, P. Metcalfe, D.C. Mosher, B.D. Ricotta, G.C. Rogers, R.J.W. Turner, G.J. Woodsworth / E.C. Ministry of Employment and Investments, Geological Survey Branch; E.T. Bobrowsky, S. Shick, W. Jickman / Simon Fraser University; P.S. Mustard / B.C. Ministry of Environment, Water Management Division; T.M. Hamilton / Design & Cartography: B.J. Groulx, T. Williams, B. Sawyer

Robert J.W. Turner, John J. Clague, Bertrand J. Groulx