

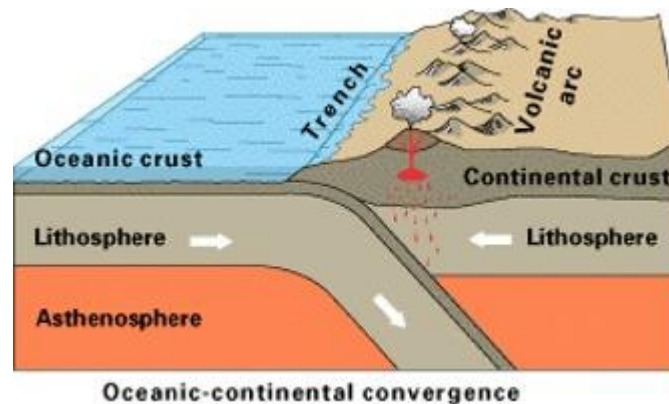
Pacific Northwest Tsunamis

Tsunamis in the Pacific Northwest

Floating debris carried by a tsunami can batter inland structures. Ships moored in harbors often are swamped and sunk or are left battered and stranded high on the shore. Breakwaters and piers collapse, sometimes because of scouring actions that sweep away their foundation material and sometimes because of the sheer impact of the waves. Railroad yards and oil tanks situated near the waterfront are particularly vulnerable. Oil fires frequently result and are spread by the waves.

Port facilities, fishing fleets, and public utilities are frequently the backbone of the economy of the affected areas, and these are the very resources that generally receive the most severe damage. Until debris can be cleared, wharves and piers rebuilt, utilities restored, and the fishing fleets reconstituted, communities may find themselves without fuel, food, and employment. Wherever water transport is a vital means of supply, disruption of coastal systems caused by tsunamis can have far reaching economic effects.

The Pacific Northwest is the site of the Cascadia subduction zone, where an oceanic tectonic plate (the Juan de Fuca plate) is being pulled and driven (i.e., subducted) beneath a continental plate (the North American plate). Earthquakes along the fault that is the contact between the two plates, termed the interplate thrust or megathrust, may generate significant local tsunamis in the Pacific Northwest.



The Pacific coastal areas and inland waters on the Strait of Juan de Fuca are the most vulnerable to tsunamis generated at a distance or by a local subduction zone earthquake. Most at risk are the people and property on beaches, at low lying areas of coastal towns and cities, near tidal flats or near mouths of rivers draining into the ocean. Computer models indicate that locally induced tsunamis from the Cascadia Subduction Zone could generate waves of 5 to 55 feet in height. A particularly nettlesome problem is the possibility of a tsunami generated by a Cascadia subduction zone earthquake in which the triggering fault could be located at a sufficient distance (i.e., offshore from northern California or northern British Columbia) that Washington coastal residents and tourists do not feel ground shaking but tsunamis generated may have travel times of an hour or less.

It is unlikely that a tsunami generated by a distant or Cascadia subduction earthquake would result in much damage in King County. However, Puget Sound is vulnerable to tsunamis generated by local crustal earthquakes (such as along the Seattle fault) or by submarine landslides triggered by earthquake shaking. Vashon Island and areas along the Puget Sound coastline could suffer damage. Warning vulnerable areas would be nearly impossible due to the close proximity to the origin of the tsunami. The first wave would probably hit coastline areas

within minutes.

In the past century, several damaging tsunamis have struck the Pacific Northwest coast (Northern California, Oregon, and Washington). All of these tsunamis were distant tsunamis generated from earthquakes located far across the Pacific basin and are distinguished from tsunamis generated by earthquakes near the coast--termed local tsunamis.

Except for the 1992 Cape Mendocino Earthquake at the southernmost part of the subduction zone, there have been no major earthquakes on the megathrust in historic time. Does this mean that the two plates are sliding past each other freely without generating earthquakes? This would make the Cascadia subduction zone unlike most other subduction zones around the world. Rather, geologic evidence is accumulating that the Cascadia subduction zone is poised between major earthquakes. Therefore, the possibility exists that local tsunamis may someday accompany a major earthquake along the Cascadia megathrust.