



PreparedBC

Earthquake and Tsunami Guide



A Narrative of Huu-ay-aht Seismic History

On January 26, 1700 at about 9 pm, a powerful magnitude 9 earthquake struck off the coast of BC, and without warning was followed by a catastrophic tsunami that devastated the village of Loht'a. With no time to respond, all 5,000 residents of Loht'a were lost to this devastating event.

This is the story of the Great Earthquake and Tsunami that was told to me by my grandparents, George and Louisa Johnson. For generations, Elders in our community as well as other First Nations along the coast have maintained this legend, and others like it, as an oral history of our people.

Today, our people call Anacla (Pachena Bay) home and this oral history plays a central role in how we understand tsunami risks in our community. We are able to use our history to learn from the past and prepare for future tsunamis.

*by Robb Johnson from
Huu-ay-aht First Nation*



*From top right, George and Louisa Johnson,
Robb Johnson, Pachena Bay on the west
coast of Vancouver Island.*

A Seismically Active Province

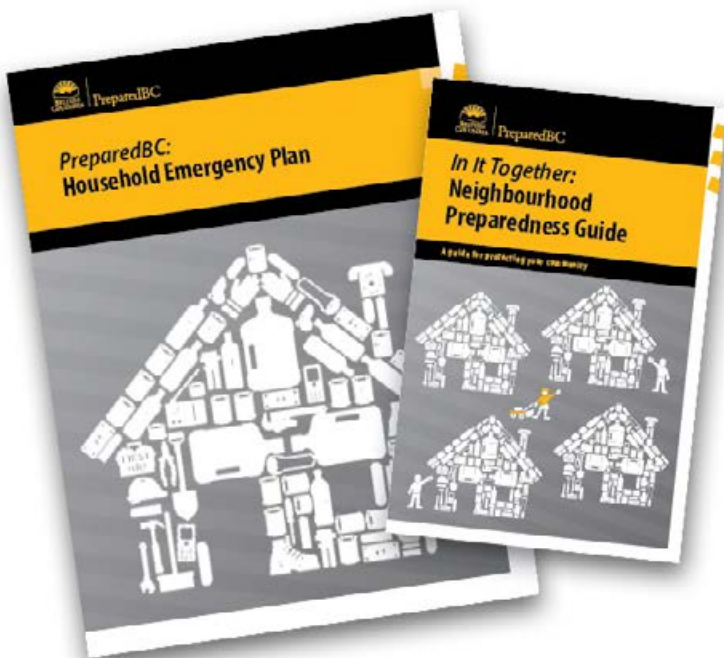
Earthquakes are common in British Columbia, with an average of 3,000 reported each year.

Most are too small to be felt, but earthquakes strong enough to cause structural damage happen, on average, once per decade. There is a good chance one of these earthquakes could be “the big one.”

The most at-risk regions of British Columbia are along the west coast, where the threat of a destructive tsunami is also very real.

It’s vital that all British Columbians take time to prepare and understand what to do both during and after a major earthquake and tsunami.

The information in this guide can help you get started. Download it and other PreparedBC resources, such as the **Household Emergency Plan** and **In It Together: Neighbourhood Preparedness Guide** from www.gov.bc.ca/PreparedBC.



Know the Risks – Earthquakes

Tectonic plates on the earth's surface are constantly moving apart, sliding past one another or colliding. It's this movement that causes earthquakes, both big and small.

Earthquakes can't be predicted – they happen suddenly. The first sign can be a loud bang or roar. You may then feel the ground shake and roll for several minutes. Aftershocks, or smaller earthquakes, can continue for many hours, even days.

In BC, earthquakes are concentrated in four settings:

1. Earthquakes along the Cascadia Subduction Zone happen when the Juan de Fuca Plate moves under the North American Plate. These types of earthquakes have the highest magnitudes and will trigger a tsunami.
2. Deep earthquakes occur well below the earth's surface, within the subducting Juan de Fuca Plate, and typically result in weaker shaking.
3. Crustal earthquakes occur within the North American Plate, close to the earth's surface and, depending on their magnitude, can cause significant damage.
4. Earthquakes along the Queen Charlotte Fault, off Haida Gwaii, happen when the Pacific Plate slides past the North American Plate horizontally. These earthquakes have been some of the largest recorded in BC.

No matter the type or location of an earthquake, individuals need to prepare and understand how to respond.

The five biggest earthquakes to strike within BC occurred in 1700, 1946, 1949, 1970 and 2012. They ranged in magnitude from 7.3 (1946) to 9.0 (1700).

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Drop, Cover and Hold On

When you feel the ground shake, immediately *Drop, Cover and Hold On*. These three simple steps have saved lives in earthquake zones around the world.



Drop to your hands and knees. This position prevents you from falling, but allows you to move if necessary. If you're inside, stay inside. Don't run outdoors or to other rooms. Most injuries occur when people are knocked over or struck by flying debris.

Cover your head and neck with your arm and take shelter under a sturdy piece of furniture. If there is no shelter nearby, crawl to the nearest interior corner or wall while continuing to protect your head and neck.

Hold On to your shelter, covering your head and neck until the shaking stops. Count to 60 before getting up, giving unanchored objects time to settle.

Move cautiously, looking for hazards from above and below. Check gas, water and electrical lines. Be aware that there may be other hazards caused by an earthquake, including fire, landslides and liquefaction.

Next Steps

Stay in your home if it's safe to do so. If your house has suffered considerable damage and poses a risk, leave immediately. The same applies if you're directed to evacuate by local authorities. Take your grab-and-go bags and listen to official instructions via reliable sources.

Reception centres may be opened to help with food and lodging, and for those who have been injured.

Only call 911 for life-threatening emergencies.



Always anticipate aftershocks. Drop, Cover and Hold On during aftershocks as well.

Practice *Drop, Cover and Hold On* at home and work so it's second nature during an earthquake. Join others by participating in the annual Great British Columbia ShakeOut. Register today at www.shakeoutbc.ca

Shake Out™

Make a Plan

Phone, gas, electric and water services may be disrupted following an earthquake. Roads could be blocked, stores closed and gas stations out-of-service.

You and your family could be on your own for several days while emergency responders work to save lives and manage the aftermath. It may be weeks before infrastructure, utilities and essential services are restored.

Thinking ahead and creating an emergency plan will strengthen your ability to respond and recover. Remember to consider the unique requirements of everyone in your home, such as children, pets and those with additional preparedness needs.

Download PreparedBC's fill-in-the-blanks emergency plan from www.gov.bc.ca/PreparedBC and complete it with the members of your household.

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- ☐ 1. Identify the risks for your region.
 - ☐ 2. Make an emergency phone list with at least one out-of-area contact.
 - ☐ 3. Pick a meeting spot if you're separated from family members.
 - ☐ 4. Assign someone to collect your children from school or daycare if you can't.
 - ☐ 5. Identify what official sources you'll get information from.
 - ☐ 6. Learn how to turn off utilities.
 - ☐ 7. Store enough emergency water for your family.
 - ☐ 8. Store enough emergency food for three days to one week.
 - ☐ 9. Identify any special needs, such as medications, and make sure a proper supply is on hand.
 - ☐ 10. Secure your space.
 - ☐ 11. Create grab-and-go bags.

Store Emergency Supplies

If your house, apartment or condominium is structurally sound following an earthquake, the best thing you can do is shelter-in-place. In other words – stay home. This will help first responders do their job and ensure emergency reception centres are available to those who need them most.

Collect enough non-perishable food, water and emergency supplies to support your household for a minimum of three days, although your target should be a week to two weeks. Make sure everything is stored together in an accessible location.



You should also prepare grab-and-go bags for each family member, including pets, in case you have to leave your home. These should be smaller versions of your basic household emergency kit, but customized to meet unique personal or medical needs. Ensure the bags are accessible and that everyone knows where they are.

Live in a multi-unit building? Download PreparedBC's *Apartment, Condominium and Townhouse* guide for information on storing supplies collectively.

Prepare your Home

Severe shaking can topple large furniture and appliances, toss heavy items from walls and shelves, and throw open cupboards. To prevent these things from happening:

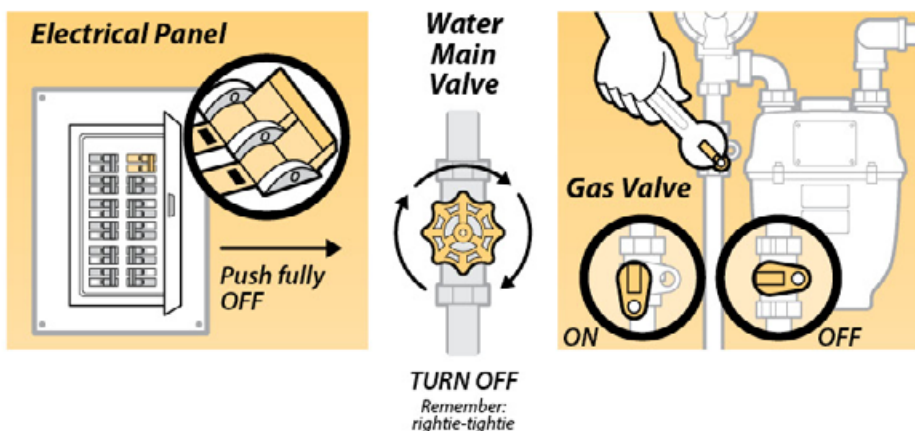
- Secure tall, free-standing furniture, such as bookcases, cabinets and shelving to wall studs using “L” brackets, corner brackets or anodized aluminum moulding.
- Move framed pictures and mirrors away from beds, couches and chairs.
- Secure cabinet doors with push or pull latches.
- Use strong strapping and ratchets or other connectors to secure refrigerators, freezers, washers and dryers.
- Anchor water heaters snugly to the wall with straps. If necessary, contract a licensed gas fitter to install a flexible gas line.



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You should also know how to turn off your home's *electrical panel*, *water* and *gas valves* in case of leaks or if you're instructed to do so by local officials.

IMPORTANT: If you suspect a gas leak, turn off the gas valve and leave immediately. Once the gas is shut off at the meter, DON'T try to turn it back on. Only a registered gas contractor can do that safely.



Whether you rent or own, insurance is available to help you rebuild and replace your belongings after a loss. Review your policy on an annual basis to ensure you're adequately protected. Contact your insurance representative or the Insurance Bureau of Canada at 1 844 227-5422 for information regarding home insurance, including whether earthquake insurance is available to you.

Basic Emergency Supply Kit



First Aid kit and medications



Battery-powered or hand crank radio



Battery-powered or hand crank flashlight with extra batteries



Whistle to signal for help



Cell phone with chargers, inverter or solar charger



Copy of your emergency plan, copies of important documents and cash in small bills



A three-day to one-week supply of non-perishable food and manual can opener



Garbage bags, moist towelettes and plastic ties for personal sanitation



Water, four litres per person per day, for three days to one week, for drinking and sanitation



Dust mask to help filter contaminated air



Seasonal clothing and footwear

Know the Risks – Tsunamis

Tsunamis are most often caused by huge undersea earthquakes that displace a massive volume of water and trigger a series of large waves. The waves can be up to 100 kilometres long and spaced as much as an hour apart. Beaches, bays, tidal flats, coastal river banks and inlets along BC's coastline are the most vulnerable to potential damage.



This logo has been adopted as the tsunami hazard symbol for British Columbia.



Know Where to Go

If you live in an area at risk of a tsunami, get to know your local evacuation routes and reception centre locations. In areas along the outer coast of BC, which don't have local tsunami evacuation maps or plans, practice routes that will take you to at least 20 metres above sea level.

It may take hours for waves to reach the shore following an earthquake far away in the Pacific Ocean, but a strong earthquake near land could generate a tsunami that arrives in just minutes. Authorities may not have time to warn you, especially if you're in a remote area. In this case, the best alert is the earthquake itself. If you are near the coast when an earthquake occurs, *Drop, Cover and Hold On* then move to higher ground **immediately**.

Once at higher ground, stay there! Tsunami waves can last several hours and the first wave is not always the largest. Wait for the "All Clear" from local officials before assuming the event is over.



Never go to the coast to watch a tsunami.

Never go down to the water if you see it start to recede as this could be an indication that a tsunami may follow. A tsunami moves faster than a person can run. **Move to high ground immediately!**

Host a **High Ground Hike** in your community where participants run, walk or hike to "high ground" following a marked evacuation route. Find everything you need to run your community's event at www.gov.bc.ca/PreparedBC.



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Tsunami Alerts






The Tsunami Warning System is an international program to detect tsunamis and provide notification and warnings to all countries bordering the Pacific Ocean, Indian Ocean and the Caribbean. Emergency Management BC receives alerts from the National Tsunami Warning Center in Palmer, Alaska and sends alerts and information to:

- municipalities, regional districts and First Nations in at-risk zones;
- RCMP, Canada Coast Guard, the Canadian Forces, NAV Canada, Environment Canada and other federal government agencies;
- provincial and federal officials; and
- news media.

Once a community is alerted that a tsunami is (or may be) expected, residents will be warned in different ways by local officials. Possible methods are radio, television, telephone, text message, door-to-door contact, social media, weather radios and/or outdoor sirens. Find out how your community plans to share information in advance, and always follow instructions from emergency officials during an event.

Not all coastal areas will be impacted by a distant source tsunami, and full evacuation would not be necessary. Check with your local government to find out if your community is at risk.

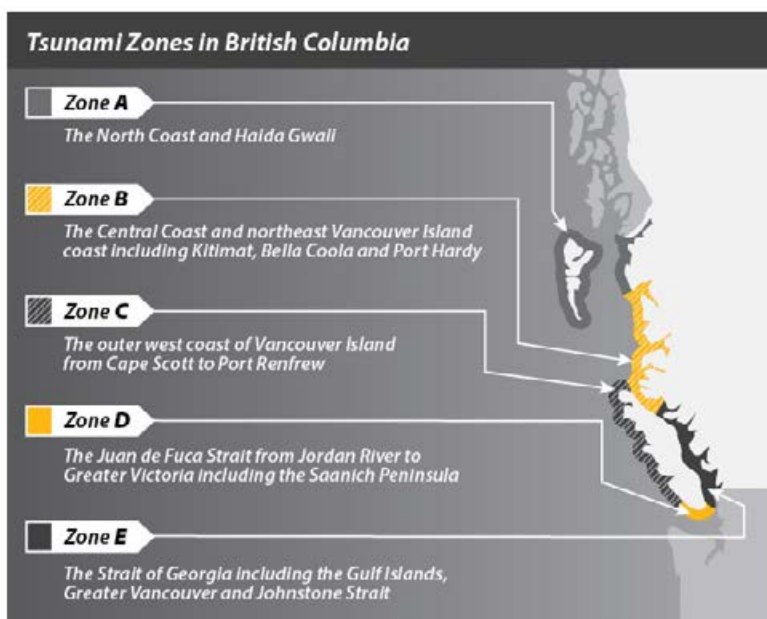
There are five alert levels and each has a distinct meaning

Alert	Description	Action
 Warning	<i>Flood wave possible</i>	Full evacuation suggested
 Advisory	<i>Strong currents likely</i>	Stay away from the shore
 Watch	<i>Danger level not yet known</i>	Stay alert for more information
 Information Statement	<i>Minor waves at most</i>	No action suggested
 Cancellation	<i>Tidal gauges show no wave activity</i>	Confirm safety of local areas

Know Your Zone

BC's coastal communities are divided into five tsunami notification zones. Each zone includes all islands and inlets within in it.

Knowing your zone will help you determine whether your community is under a warning, advisory or watch issued by the National Tsunami Warning Center and shared by Emergency Management BC. Detailed maps can be found at www.gov.bc.ca/PreparedBC.



ShakeOutBC: www.ShakeOutBC.ca

Notes



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This material has been prepared by the Province of British Columbia in cooperation with:



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Front cover: Damage to the facade of a masonry building from the 2001 Nisqually earthquake that impacted Seattle and surrounding areas.

Below: This turn-of-the-century wooden residence sustained major damage when it moved off its foundation during an earthquake.

