WA CSZ Tsunami Loss Estimate

Mason County

There is a 15–25% chance that Washington state will experience a CSZ earthquake and tsunami within the next 50 years. Washington Emergency Management Division's (WA EMD) Tsunami Program used FEMA's tsunami Hazus module, along with an updated building inventory within the tsunami inundation zone and 2020 US Census data, to conduct a loss estimate for the Cascadia Subduction Zone (CSZ) Extended L1 M9.0 Earthquake and Tsunami scenario (Washington Geological Survey, 2024). A 2:00 AM weekend midsummer scenario was used and permanent, temporary, and employee populations in the tsunami inundation zone were analyzed. Hotels, RV parks, and marinas were assumed to have full occupancy. The earthquake would generate 3–6 minutes of strong ground shaking felt across the state. The earthquake will produce a major tsunami reaching Washington's outer coast within 10–20 minutes and the inner coastal areas within hours. For more details, you can view the full WA CSZ Tsunami Loss Estimate study, along with its associated data, methodology, and materials at mil.wa.gov/tsunami.

Scan to learn more!

Casualty Estimates

Casualties By Evacuation Departure Delay Time

10 min	15 min	20 min
0	0	13

Casualties (combined injuries and fatalities) were estimated using standardized FEMA Hazus methodology and the United States Geological Survey (USGS) Pedestrian Evacuation Analyst Tool. This includes time and distance to get to high ground before the first tsunami wave arrives. Departure time assumptions are 10 minutes, 15 minutes, and 20 minutes from the start of the earthquake (which includes an estimated 3-6 minutes of shaking). For populations under age 65, the standard walk speed to safety is 2.45 mph (standard crosswalk speed, United States Department of Transportation). For those age 65 and above, as well as those with mobility or vision impairments, walk speed is adjusted to 2.0 mph, which is 80% of the standard walk speed.

Population Estimates

Total Population	Permanent	Temporary	< 65 Years Old	≥ 65 Years Old
5,545	1,911	3,634	3,089	2,456

A 2:00 AM weekend midsummer scenario was used to estimate the likely locations of individuals at the onset of the incident—primarily in their beds. It is assumed that people are located inside buildings, campsites, RVs, or aboard liveaboard vessels in marinas. Employees working overnight shifts in 24/7 operations—including industrial facilities, correctional institutions, and emergency operations centers—were also included in temporary population. Permanent population was based on 2020 U.S. Census data. Temporary population assumes full occupancy of all lodging facilities, including campgrounds, RV parks, and hotels. Population was further categorized by age—those over 65 and those under 65—including individuals with mobility or vision impairments.

Building Loss Estimates

Building Content and Repair Cost

$50M - $73M

# of Damaged Buildings: 1,050 - 1,196	Building Damage Ratio: 81.4% - 92.8% (damaged buildings/total buildings)

Percent of Buildings Damaged by Level of Damage

9-11% Complete	6-9% Extensive	21-37% Moderate	35-45% Slight

Building and content replacement costs and damage estimates from the combined earthquake and tsunami impacts are shown as a range for the USGS CSZ 50th and 84th percentile ground shaking scenarios. Damage estimates were developed using FEMA's Building Probability of Damage States (PDS) in Hazus. Building and content replacement costs were calculated using Gordian Group RSMeans methods, adjusted to 2021 dollars. The Hazus tsunami module does not account for damage or losses to maritime-related facilities such as ports and marinas, nor does it include impacts to infrastructure, road networks, or essential facilities.

Tsunami Risk Reduction in WA

Washington state has more than 3,000 miles of shoreline — this makes Washington tsunami country! Tsunamis can happen at any time and can impact any stretch of our coastline, posing a serious threat to life safety. There are many actions you can take to improve personal preparedness and reduce community risk whether you're a community member, an elected official, or a decision-maker in emergency management. Together, we can equip ourselves with the tools needed to reduce impacts and save lives. Learn more about what actions, tools, and resources you and your community can utilize to better prepare for and reduce risk from tsunamis in your community below. For more information or guidance, go to mil.wa.gov/tsunami or email public.education@mil.wa.gov.

Scan to learn more!

What Can I Do?

Sign Up for Alerts

Sign up for emergency alerts, including local alerts, USGS ShakeAlert earthquake early warning and tsunami alerts at mil.wa.gov/alerts.

Pack a Go-Bag

Pack a go-bag for each person and pet in your household with essential items needed to survive for at least 72 hours. Make it personal. Learn more at mil.wa.gov/preparedness.

Family Emergency Plan

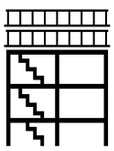
Create an individual or family emergency plan, including how you will communicate, evacuate, and reunite with loved ones. Learn more at mil.wa.gov/preparedness.

Walk Evacuation Routes

Practice walking your tsunami evacuation route. Take part in community evacuation drills and register for the Great Washington ShakeOut at shakeout.org/washington.

What Can My Community Do?

Build Vertical Evacuation Structures



Vertical Evacuation Structures (VES) provide essential life-saving refuge above tsunami waves in areas without accessible high ground, especially along Washington's outer coast. These structures are built to withstand earthquakes, tsunami waves, and high-impact debris. With over 175,000 people at risk in the tsunami inundation zone, Washington state needs at least 58–80+ VES to give people timely access to high ground. Learn how to bring one to your community in WA EMD's Tsunami Vertical Evacuation Manual.

Harden Evacuation Routes

Tsunami evacuation routes are essential to get people to safety in an efficient and effective manner. Addressing accessibility issues along routes increases this possibility. Route hardening and regular maintenance ensures routes are accessible to evacuating pedestrians even after several minutes of ground shaking.

Maritime Mitigation and Response

Print and place the Washington Tsunami Boater's Guide at your local port or marina to spread awareness of protective action guidance for boaters. Read previously completed Maritime Response and Mitigation Strategies to learn key response and risk reduction actions and successful strategies from other ports in Washington state. Work with your port on tsunami response actions to improve coordination in tsunami response.

Education and Outreach

Educate at-risk communities about tsunamis. This includes people visiting or new to living in the tsunami inundation zone, such as tourists, employees, seasonal workers or military service members and their families.

Install Tsunami Signage

Tsunami wayfinding helps the public become better aware when they are in a tsunami hazard zone and to clearly identify evacuation routes so they can reach high ground before tsunami waves arrive. Utilize the Washington State Tsunami Wayfinding Guide to help you determine where to install new signs and other wayfinding resources.

Complete Evacuation Maps

Tsunami evacuation walk maps assist coastal residents and visitors in finding the nearest routes to high ground in case of a tsunami. Contact Washington Emergency Management Division and the Washington Geological Survey's tsunami programs to identify tsunami evacuation routes and design maps for your community.

Tsunami Response Planning

Complete local and tribal tsunami response planning. One way to do this is to participate in local, state, tribal, and federal tsunami exercises to test alerting and response procedures.

School Evacuation Drills

Evacuation drills provide a great opportunity for students, teachers, and staff to practice personal protective actions, such as Drop, Cover, and Hold On, and evacuating to high ground. All Washington public schools are required to conduct earthquake drills and schools located in the tsunami inundation zone are required to complete tsunami evacuation drills each year. One way to do this is to have all schools participate in the Great Washington ShakeOut. Register your drill at shakeout.org/washington.