

## Tsunamis: an Introduction

What is a tsunami?

How may tsunamis affect me?

How large will the next tsunami be, and when will it happen?

Why should I care now?

What can I do about it?

Where can I learn more about tsunamis in Washington?

### **If you feel an earthquake, move to higher ground.**

Tsunamis may form during earthquakes, and may arrive on the coast in as little as 15 minutes. Evacuate on foot because roadways and bridges will sustain major damage in a large earthquake.

### **Cascadia subduction zone tsunamis occur in Washington between every 300-500 years.**

The last subduction zone tsunami occurred over 300 years ago, in 1700 AD, so expect another at any time.

### **Prepare for tsunamis:**

- Plan and practice on-foot evacuation routes.
- Pack a “go bag” to sustain yourself for days.
- Sign up for tsunami alert notifications.

### **What is a tsunami?**

Tsunamis are fast-moving waves that form when a large volume of water is suddenly displaced. Most of the time, tsunamis form during large earthquakes that disturb the ocean floor. Tsunamis can also form in oceans, lakes or other waterways when landslides above or below the water’s surface cause water to be displaced. Tsunamis are not like beach waves, but rather are a series of dangerous waves that move very quickly and go much farther inland than high tides or storm surges. Tsunami waves will continue to affect the coastline for many hours, and the first wave to arrive is not always the largest.



*Damage from the 2011 Tohoku tsunami in Japan.*

### How may tsunamis affect me?

If you live, work, or visit the coastline, you could experience a tsunami. Tsunamis are extremely hazardous, and can happen anytime. You can't outrun a tsunami, and even a one foot high tsunami can knock people down, move cars, and damage buildings. In the 2011 Tohoku earthquake in Japan, the tsunami that formed was more deadly than the initial earthquake, and resulted in over 15,000 deaths. The 2004 Indian Ocean tsunami killed over 230,000 people.



*Tsunami hazard signs like this one are present in coastal areas identified as being in tsunami inundation zones.*



How large will the next tsunami be and when will it happen?

The Pacific coast of the U.S. is vulnerable to tsunamis from the Cascadia subduction zone, a large fault on the ocean floor near Vancouver Island, Washington, Oregon, and Northern California. The Pacific coast is also vulnerable to tsunamis from other subduction zones around the Pacific Ocean's Ring of Fire. In Washington, "local" tsunamis from Cascadia will be larger (over 50 feet high in places) than "distant" tsunamis from around the Pacific Ocean. These distant tsunamis can still be deadly and damaging in low-lying areas. Cascadia tsunamis occur every 200-600 years, on average, while distant source tsunamis happen more frequently, every 10 years or so somewhere in the Pacific.



*A layer of sand deposited by a tsunami in what is now Washington State in the year 1700. This was the most recent tsunami from the Cascadia subduction zone. With expected recurrence of between 300-500 years, Washington could experience a Cascadia subduction zone earthquake and tsunami any day. (Photo by Carrie Garrison-Laney, WSG)*

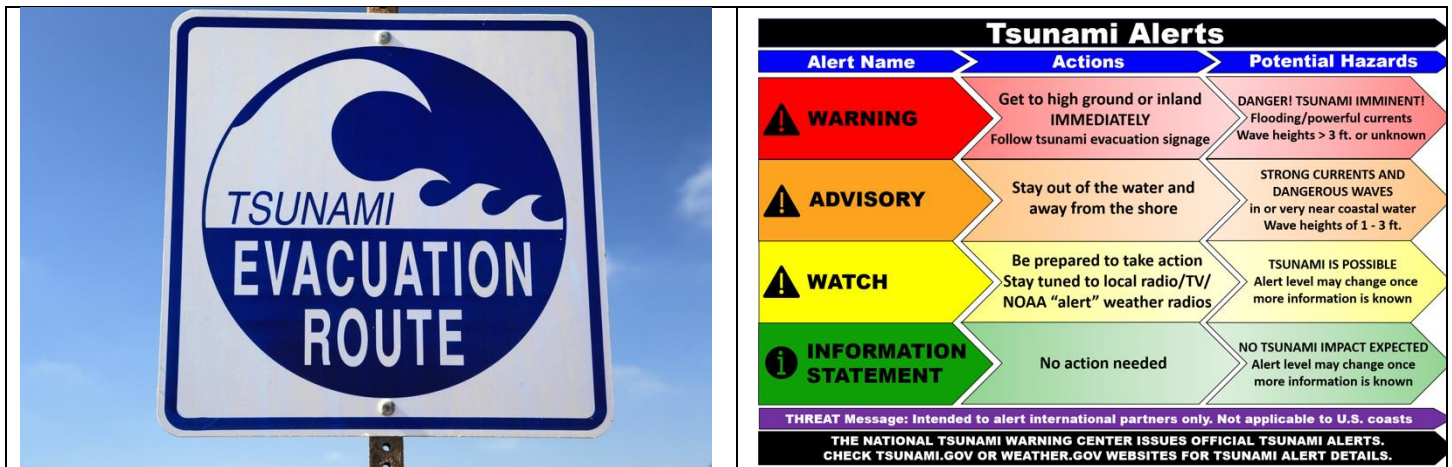


Why should I care now?

Coastal areas vulnerable to tsunamis can improve their future outcomes if they know what to expect. Awareness and preparedness will prevent loss of life, limit damage, and protect the environment. Citizens who know how to evacuate and care for themselves will fare far better than those who don't recognize the deadly threat from tsunamis. Also, careful planning of the types of structures and materials located in tsunami inundation zones will improve community recovery after a tsunami.

What can I do about it?

- Determine your hazard. Look up the inundation zone where you live, work, or visit. Determine whether you are vulnerable to tsunamis by visiting the Washington Department of Natural Resources tsunami hazard maps page at: <https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/Tsunamis#tsunami-hazard-maps>
- Determine your on-foot evacuation route and practice it. Evacuating on foot is recommended because large tsunami-forming earthquakes will damage roads and bridges and cause landslides. Don't expect roads to be passable. Evacuation maps for many Washington locations are available here: <https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/Tsunamis#preparation-and-evacuation.6>
- Prepare a "go bag." A go bag contains all the items you will need to keep yourself warm, dry, and fed for hours or days. Depending on your location and the severity of the earthquake and tsunami damage, you may be on your own for many days. Lists of items recommended for go bags are listed in this printable brochure: <https://www.mil.wa.gov/uploads/pdf/emergency-management/2-weeks-ready-brochure-print-ready-version.pdf>
- Sign up for tsunami alert notifications from a variety of different sources. Tsunami alert messages can be received as text messages, emergency alerts on your phone, through social media, and through NOAA weather radios. To learn more about sources for messages, and to sign up for alerts, visit: <https://www.tsunami.gov/?page=productRetrieval>
- Learn what the different tsunami alert messages mean. Do you know the difference between a tsunami watch and a tsunami warning? Understand the alert messages to understand the threat. For information about the different alert messages and their meaning, visit: [https://tsunami.gov/?page=message\\_definitions](https://tsunami.gov/?page=message_definitions)



A tsunami evacuation route sign (left) shows where to go to get to safety. Tsunami alert messages (right) help coastal residents understand the approaching tsunami hazard level.

### Where can I learn more about tsunami hazards in Washington?

To learn more about tsunamis and how to prepare, visit:

- Washington Emergency Management Division: <https://www.mil.wa.gov/tsunami>
- Washington Department of Natural Resources: <https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/Tsunamis>
- U.S. Tsunami Warning System: <https://tsunami.gov/>
- Washington Sea Grant's Tsunami Hazards in Washington State brochure: <https://wsg.washington.edu/wordpress/wp-content/uploads/Tsunami-Hazards-Wa-State.pdf>
- NOAA Tsunami Frequently Asked Questions: <https://www.tsunami.gov/?page=tsunamiFAQ>
- NOAA Center for Tsunami Research: <https://nctr.pmel.noaa.gov/index.html>
- National Weather Service: <https://www.weather.gov/safety/tsunami>
- NOAA Tsunami Information: <https://www.tsunami.noaa.gov/>
- NOAA Tsunami Education: <https://www.noaa.gov/education/resource-collections/ocean-coasts-education-resources/tsunamis>
- Pacific Northwest Seismic Network: <https://pnsn.org/outreach/earthquakehazards/tsunami>
- U.S. Geological Survey: <https://www.usgs.gov/news/preparing-tsunami-hazards-washington-s-pacific-coast>

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