

## **Not My Fault: Measuring earthquake size is not so straightforward**

Lori Dengler/For the Times-Standard

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<https://www.times-standard.com/2021/09/11/lori-dengler-tsunami-safety-begins-with-you/>

Tsunami safety begins with you. You and your loved ones can only be tsunami safe if you understand the signs that a tsunami is on its way and know how to respond.

Let me illustrate in two scenarios. The first is a large earthquake from far away. The two US Tsunami Warning Centers (NTWC in Alaska and PTWC in Hawaii) will analyze seismic signals from the earthquake in a few minutes and estimate the location, size, and tsunami potential. A scenario is a pretend but realistic version of what might happen – for my scenario, this first magnitude is in the low 8s located south of the Alaska Peninsula.

PTWC issues bulletins for Hawaii, Guam, American Samoa, and other countries in the Pacific. NTWC issues bulletins for Alaska and the West Coast - the only ones we should pay attention to. In my scenario, the first bulletins announce a Tsunami Warning for the coastal areas of the Aleutian Islands and Southern Alaska and a notice that the threat is under analysis for other areas.

Terminology can be confusing. For tsunamis, the highest level of threat is a Tsunami Warning. For wildfires, a warning is the second highest level and means be prepared to evacuate and a wildfire order is at the top and means get out now. I wish there were more consistency - it's not helpful that different terms and rating scales are used for various hazards.

The current terms for tsunamis are warning, advisory, watch, and statement. On the first day of my Natural Disasters class, I used to ask a set of questions. One was on tsunami terms – which was the most serious and which was the least. I found that students were just as likely to rate “statement” as the highest threat as they were “warning.” The threat level in the terms weren't obvious.

No matter what word is used, pay attention to the description and actions required. NOAA defines Tsunami Warning as “Take Action—A tsunami that may cause widespread flooding is expected or occurring. Dangerous

coastal flooding and powerful currents are possible and may continue for several hours or days after initial arrival. Follow instructions from local officials. Evacuation is recommended. Move to high ground or inland”.

How soon? Arrival time is the easiest parameter to determine for tsunamis, depending only on location. NOAA's National Centers for Environmental Information (NCEI) has a web portal for to make a map of how long it will take the first tsunami waves to reach you ([https://www.ncei.noaa.gov/maps/ttt\\_coastal\\_locations/](https://www.ncei.noaa.gov/maps/ttt_coastal_locations/)).

When I enter Crescent City, I see that tsunamis coming from the Alaska Peninsula take 4.5 hours to get here. Forecasts are for the first wave arrival, not the largest. On our coast, tsunamis often last 12 hours or longer and the largest could be hours after the first.

Time is of the essence. My emergency management colleagues say three hours is the minimum for a coordinated, well-organized evacuation. The tsunami warning centers can recommend evacuation, but not order them. Evacuations are the responsibility of local governments. In our case, Humboldt and other California counties, in consultation with the Weather Service and State agencies, would make the call.

The tsunami warning centers are very busy after the first bulletin. The USGS determines a more definitive magnitude in another few minutes that, for my scenario, puts it into the upper 8 category. They also get data from one or two deep ocean DART sensors confirming that a tsunami has been generated. Pre-computed algorithms allow the new data to be inserted into hazard forecasts and run new estimates. This new information makes it clear that the tsunami threat extends far further than Alaska.

A second series of bulletins are issued a half hour later revising the magnitude and expanding the tsunami warning area. The West Coast from Mendocino County north to Alaska is now in the warning zone. Conference calls with local and state government representatives and the regional NWS offices will make a determination of how what areas need to be evacuated and how to notify the public.

Everyone in emergency response is very busy at this point. County supervisors are requested to declare a local emergency. Humboldt County has nearly 30 different agencies/organizations/tribes responsible for our coastline and all need to be part of a coordinated process. Multiple methods of notification go into play including the County Everbridge notification system, Emergency Alerts on radio and television, sirens, and door to door notifications in

areas most at risk. If weather permits, civil air patrol planes may fly over the area with audible announcements.

Your responsibility is to be reachable, to understand your potential hazard and what you might need to do. Sign up for county emergency alerts and think about how a tsunami warning would impact you and your family. If an evacuation is order, comply as quickly as you safely can and stay away until permitted to return.

My second scenario won't take nearly as long to describe. The earthquake happens here – right here beneath our feet. It's the same magnitude as my first scenario – upper 8s or perhaps a 9. But I won't know that until long afterwards. I will learn about the earthquake when the ground begins shaking. And the ground will keep shaking for more than a minute. The earthquake knocks out the power and makes a mess. Internet doesn't work. The phone doesn't work. I am on my own. I need to make the assessment of whether I am in a tsunami zone and what to do. I need to know that the earthquake was my warning and, without any official guidance, to get myself to a safe place in as little as ten minutes. And once I leave, I have to stay away until I get official notification that it is safe to return.

If I can do this – you can too. We've got this.

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