

Not My Fault: A new era for tsunami maps

Lori Dengler/For the Times-Standard
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On Thursday, the California Geological Survey (CGS) released updated tsunami maps for Humboldt County. If you have been reading this column for a while, I frequently talk tsunami. The only way to be safe from an impending tsunami is to get out of the hazard zone. Preparedness begins with accurate, well-vetted tsunami maps.

I have been working on the North Coast tsunami hazard for nearly three decades. The 1992 Cape Mendocino earthquake was the first event to not only raise my concern, but also make an impression on the larger tsunami science community. Why? Because it produced a small local tsunami, one produced by an earthquake nearby.

Local tsunamis are very different from those that come from far away like 1964 Alaska or 2011 Japan because the time between the earthquake and the arrival of tsunami waves is on the order of minutes to tens of minutes and there is no time for official notification or a coordinated evacuation. YOU need to be aware of where you are and if you need to evacuate with no official prompting. And local tsunamis are often the largest potential tsunami we are likely to face – because tsunamis lose amplitude as they spread out away from the source.

The 1992 tsunami was too small to cause any damage, but larger earthquakes and larger tsunamis have occurred in the past and will do so again. At the time, there was a system in place for tsunamis coming from far away, but nothing addressing the near-source tsunami. As we studied the 1992 tsunami, it became clear that we needed maps to address the potential hazard.

Two years after the 1992 earthquake, NOAA's Pacific Marine Environmental Laboratory published the first tsunami hazard map of our area, based on a M8.5 earthquake on the Cascadia subduction zone. It used early generation tsunami modeling and had a number of inaccuracies, but established for the first time in press that we could experience a significant tsunami following a great earthquake.

I wouldn't describe that 1994 tsunami map as wrong. It was based on the best available information at the time and made what is still the basis of all our outreach efforts – the beaches and near coast areas are the highest risk and feeling the ground shaking will be your first warning. As we learned more about the tsunami hazard, maps improved. In 2003, Jay Patton and I released a set of relative tsunami hazard maps for Humboldt County. Jay was a graduated student in the HSU Geology Department at the time and a GIS wizard. We developed a set of criteria for tsunami heights based on observations from recent tsunami events and using the elevation data available at the time, showed areas of high risk, moderate risk, low risk and safe areas. Jay went on to get a PhD and is now a lead scientist in the CGS team that produced the new maps.

Our 2003 maps were superseded in 2009 by the release of the first comprehensive CGS State maps. The 2009 maps used the best tsunami model, elevation and seafloor data of the time and compiled a set of inundation maps for every conceivable source both near and far. The maps were overlain to compile a worst-case tsunami-flooding map for all coastal counties with an additional factor of safety for high tide. The Redwood Coast Tsunami Work Group took the models and developed tsunami hazard maps – taking an even more conservative approach by using geographic features such as roads to delineate boundaries between safe and "all bets are off" areas. These maps became the base for posting tsunami hazard zone signs and for planning regional response.

Technology hasn't sat still in the past 11 years. There were major tsunamis in 2009, 2010 and 2011 that helped to constrain and further develop modeling capacity. LIDAR improved elevation resolution, allowing smaller creeks and inlets to be accurately mapped and to identify potential areas of high ground that were lost on the older 10-meter topographic maps. In a rapidly developing field like tsunamis, CGS always intended that their mapping be reviewed every decade.

On Thursday, Humboldt County became the first in California to see the results of the review and new mapping process. Two maps were released. The first was similar to the product developed in 2009 – a compilation of all potential sources into a maximum inundation or flooding map. The second is a potential hazard map. CGS, working with local officials and the RCTWG added extra distance inland of the maximum inundation as an extra cushion, so that no one needs to fret about whether the water is ankle high or knee high.

The results of the new maps are generally good news for Humboldt County. Most of the area has seen little change and of the areas that did change from 2009, the hazard area has decreased by nearly 1%. The biggest decreases are seen in the Eel River Valley and on the Samoa Peninsula. Fairhaven now has a small area of sufficiently high ground to plan evacuation routes and practice drills. And there are a few areas where the hazard has increased. LIDAR revealed some gullies and creeks near the Bay where tsunami waters could extend further than believed in 2009.

These new maps will only reduce our tsunami threat if you and our county planners use them. CGS has developed an easy to use platform for you to find out if you are in, out or near a tsunami zone. Visit <https://www.conservation.ca.gov/cgs/tsunami/maps/humboldt> and enter in your home or workplace address. Use the map as a guide and a starting point to talk about what you should do when a significant quake occurs how to evacuate if necessary.

For almost all of you, these new maps won't mean big changes. If you have been using the older maps to plan and practice evacuation routes for you and your family, bravo. Keep doing what you've been doing. If you are new to the area or haven't quite gotten around to tsunami planning, use the new website to find out if you are at risk. The bottom line, the maps won't help you unless you use them and recognize that shaking, especially shaking that lasts a long time, is your warning that a tsunami may soon be on its way.

Note: CGS has prepared a tsunami preparedness guide at <https://cadoc.maps.arcgis.com/apps/MapSeries/index.html?appid=61bc8d30b53e4fb5927ae199d31f5aef>

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