

Not My Fault: Earthquakes can happen anywhere

Lori Dengler/For the Times-Standard

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ShakeOut is less than three weeks away. It's been a struggle to convince people to participate. "I just don't think an earthquake will happen soon" is a common response. One person even hushed me and said earthquakes are less likely to happen if we don't talk about them.

Ignoring or wishing them away won't stop the next earthquake. There is no place in the country that doesn't have an earthquake risk. The USGS is responsible for assessing the Nation's earthquake hazard and regularly updates seismic hazard. There are many different map versions – some intended for engineers and people with ground motion backgrounds and others for a more general audience

(<https://www.usgs.gov/natural-hazards/earthquake-hazards/hazards>).

It is easy to get lost in the details of probability and focus only on the hot spots. No surprise that Alaska and California come are where you are most likely to experience a strong shaker. But some high hazard zones might surprise you including South Carolina and Oklahoma and there are no places with zero risk.

Have you ever bought a lottery ticket? The posted odds of winning the California Lottery are one in 42 million. If you bought one lottery ticket every day for the next thirty years, you would have about two hundredths of a percent of winning. In the same thirty years, your odds of experiencing a strong earthquake in Humboldt County is nearly 40%.

No surprise that California has a high likelihood of earthquake shaking. But even in the quieter areas of the country you are much more likely to experience an earthquake than win the lottery. Even in the least seismically active parts of the country like Florida and Minnesota, you are several thousand times more likely to feel an earthquake than win.

Earthquake hazard maps are based on historic earthquakes, studies of prehistoric earthquakes, and the underlying tectonic framework of the region. The maps are useful for planners and builders and are the basis for construction requirements in national building codes. But I find they can give a false impression to the casual viewer who might immediately think the bright colors are the only places that people need to worry about. A better message is that earthquakes can and do happen anywhere and no matter where you live or visit, be prepared. Here are a few examples.

9/31/1886 Charleston, South Carolina ~M7. The earthquake was centered nine miles north of the Charleston city center. This was before the era of seismographs and the magnitude estimate is based on the felt area – from New Orleans to Boston and Chicago and as far away as Cuba and Bermuda. Sixty deaths were reported and at least 2000 buildings damaged - \$5-6 million in 1886 dollars would exceed \$160 million today. There were no foreshocks and no buildup in earthquake activity prior to the rupture. Structures on filled ground were particularly susceptible to liquefaction damage. Aftershocks continued in the Charleston area for over thirty years, some large enough to cause additional damage.

10/18/1935 Helena, Montana M6.2. The earthquake was centered within the Helena city limits. Two people died, caused by the collapse of brick structures. At least twenty injuries were caused by the earthquake and a number of others from auto accidents as many people fled the city. The earthquake was felt in much of the western part of the State. Unreinforced brick structures, including schools and a hospital, were particularly vulnerable. The earthquake was the largest in a sequence that included a M5.9 foreshock and M6 and 5.5 aftershocks. The aftershocks caused additional damage to structures weakened in the earlier quakes with total losses estimate at \$5 million in 1935 dollars.

8/23/2011 Lincoln County, Virginia M5.8. The earthquake was located in Central Virginia, 37 miles NW of Richmond and 84 miles SSW of Washington DC. It was felt along the entire Atlantic coast and inland as far away as Chicago and Minneapolis. It triggered landslides 150 miles away from the epicenter. This may have been the most widely felt earthquake in the past century, experienced by nearly one-third of the US population, causing power outages, disrupting highway travel, and delaying flights throughout the Northeast. Cell phone coverage was jammed by overuse for an hour. Two buildings collapsed in Virginia and a number of buildings were deemed unusable. The earthquake damaged spires on the Washington National

Cathedral and the Washington National Monument was closed for nearly three years for repairs.

9/3/2016 Pawnee, Oklahoma M5.8. The earthquake was located in Northern Oklahoma and felt from San Antonio, Texas to Minneapolis, Minnesota. It is the largest earthquake ever recorded in the state, narrowly eclipsing the 2011 M5.7 sixty miles to the south. A number of buildings were damaged in the northern part of the State and some damage was observed in Kansas City more than 300 miles away. Unlike the other examples, this earthquake is believed to have a human cause – linked to injecting drilling waste fluids into deep wells. The 2011 and 2016 earthquakes led the State to regulate injection rates and amounts.

All of these examples occurred in areas where large earthquakes weren't common. Older brick buildings and those built on filled ground were particularly vulnerable. None of these earthquakes would rank as "the Big One" by our standards yet caused damage, injuries, and economic disruption over a large area. And lest you think that our infrastructure is more resilient today than a century ago, the breakdown in electronic communications in the recent events is a sober reminder that after the next earthquake, you likely won't have information at your fingertips.

Do yourself and your community a favor. Participate in the ShakeOut Drop, Cover, and Hold On Drill on October 21 (<https://www.shakeout.org>). Enroll your school, workplace, church group or other organization and talk to each other about how to reduce hazards.

Note: read the USGS Circular on the 1886 Charleston earthquake for a historic, social, and seismic perspective on the earthquake

<https://pubs.usgs.gov/circ/1986/0985/report.pdf>

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