

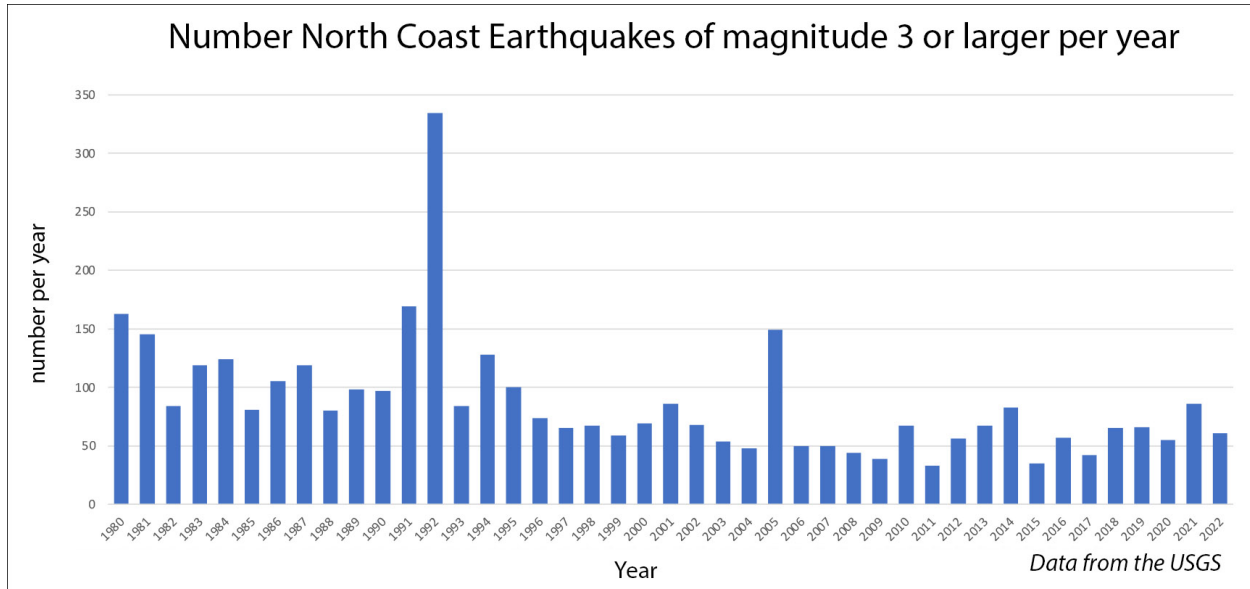
Times Standard

Not My Fault: A slightly delayed 2022 earthquakes review

Lori Dengler for the Times-Standard

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Earthquakes of magnitude 3 or larger in the North Coast region from Fort Bragg to Brookings, Oregon, inland to the Trinity County border, and the adjacent offshore areas of the Pacific and Gorda plates. Data from the USGS.

This column was started three weeks ago. But we were still feeling strong aftershocks and they took priority. The Ferndale earthquakes illustrate why a year is an artificial construct for describing earthquake activity. The aftershock sequences of both our December 2021 and 2022 earthquakes continued on into the new year.

Despite limitations, there is still value in annual summaries. It's a way to look for patterns – if established areas of earthquake activity are continuing and if new ones are emerging. It is also an opportunity to put current activity in context; to see if what is happening now is unusual or not.

Once again, the North Coast and adjacent offshore area produced the largest quake in the lower forty-eight. We won the title in 2021 and have been atop the pedestal 17 times in the past 35 years. Other parts of California have hosted the largest quake eight times and the Blanco fault far off the Oregon coast places a distant third with three. If we let Alaska in the race, it would grab the gold 29 of those 35 years.

Our December 20th M6.4 Ferndale earthquake also gains the US title for the most human impact: costliest (\$10 million and counting), 17 injuries, 2 deaths. They are the first deaths

linked to a US earthquake since the 2019 Ridgecrest earthquake killed a man working under his car in Pahrump, Nevada. Our deaths were not caused by earthquake damage but fear during the shaking may have exacerbated previously existing health conditions.

The Ferndale earthquake stands out in other ways as well. I have talked to many people who have lived on the North Coast for decades and the most common remark is “the strongest earthquake I have ever felt.” The data backs it up. Strong motion records put the Rio Dell record in the top 15 largest accelerations ever recorded anywhere.

The December 20th quake was not so unusual in other respects. Located near the Mendocino triple junction with multiple deep and shallow faults, we’ve experienced 12 earthquakes of M6 or larger in this area in the past century. Colleague Bob McPherson who ran the Humboldt Bay Seismic Network for 12 years, argues that a M5.3 earthquake in June 1975 was likely on the same fault as the 2022 quake. That earthquake was also strong for its size and triggered massive failure of the Scotia bluffs.

There’s a rumor going around that we’ve had more earthquakes since mid-December than we’ve had for a number of years. I keep tabs on earthquake activity and this rumor like many has no basis in fact. We’ve had a pretty good seismic network on the North Coast since 1980. Looking at the number of magnitude 3 and larger earthquakes per year is a proxy for our seismic pulse.

In 2022, the Berkeley and USGS seismic networks recorded 62 earthquakes of magnitude 3 and larger in the area from Fort Bragg to Brookings, Oregon, inland to the Trinity County border, and offshore to the Gorda ridge. More than half of these were close enough to populated areas to be felt. That may seem like a large number but compared to previous years it was below the 86 per year average and the 68 per year median since 1980. It pales in comparison to our most seismically active year in 1992 when 334 earthquakes were recorded. 1992 encompassed the Cape Mendocino earthquake sequence with a 7.2, 6.5 and 6.5 in a 15-hour window and a very vigorous aftershock sequence that persisted into the next year.

But the ’92 quakes weren’t the only things shaking in the 1980s and 90s. It was a much more active period than we have been in since then. Fortunately, many of our earthquakes were too far offshore to cause damage but even some of our smaller ones like the M5.6 in 1996 just offshore of Eureka took a bigger financial bite than the recent M6.4.

The North Coast wasn’t the only 2022 earthquake story in the US. Texas with 226 M3 or larger earthquakes nearly edged out California (232) for the most earthquakes in the lower forty-eight. Texas is far from plate boundaries and prior to 2016 experienced fewer than 20 earthquakes a year. That number began rising in 2018 and increased sharply two years ago as drilling and hydrofracturing required the disposal of large volumes of waste drilling fluids in deep disposal wells.

Most of these earthquakes are concentrated in a narrow area of West Texas where not only the number but also the magnitude of earthquakes increased. Last year, twenty-one M4 and larger quakes were recorded and two reached the M5 level. The November 16 M5.4 is the third largest earthquake ever recorded in Texas and agencies are looking into possible regulatory

measures to reduce these induced quakes (<https://www.texastribune.org/2022/11/18/texas-earthquake-fracking-railroad-commission/>).

Regulation of the volume and rate of drilling wastes works. Oklahoma recorded over 800 M3 and larger earthquakes at the height of its disposal period in 2015 before regulations were enacted. Each year since then, earthquake numbers have fallen and only 12 were detected last year.

Earthquake activity in the Western US continues to slow as aftershocks following the 2019 and 2020 earthquakes decline. Aftershock sequences are over when the rate of earthquake activity returns to the pre-earthquake background level and we aren't quite there yet.

By the earthquake numbers, global earthquake activity was relatively quiet. The largest were a pair of M7.6s in Papua New Guinea and in Mexico. Both caused some damage and casualties but were far less devastating than smaller quakes.

The worst of the year was Southeastern Afghanistan's M6.0 in June where the death toll stands at 1,163. A M5.6 in November on Indonesia's most populated island of Java killed at least 335. In both cases, these shallow earthquakes produced strong shaking over a small but highly populated area where many structures were not designed to resist earthquakes.

The themes of 2022 earthquakes are magnitude should not be confused with ground shaking strength. Earthquakes in the magnitude 5 and 6 range can be damaging and deadly when located in vulnerable areas and, if it hits near you, it is the big one.

Lori Dengler is an emeritus professor of geology at Cal Poly Humboldt and an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times-Standard's. All Not My Fault columns are archived online at <https://kamome.humboldt.edu/resources> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email rctwg@humboldt.edu for questions and comments about this column, or to request a free copy of the North Coast preparedness magazine "Living on Shaky Ground."