

## **Not My Fault: The 1992 earthquake changes minds**

Lori Dengler/For the Times-Standard

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Earthquakes are relatively common in Humboldt County. By my count, I have felt 28 since I arrived here in 1978. Anyone who has lived here this long will have a similar list. North Coast California and the adjacent offshore area is the most seismically active region of the lower 48 states, accounting for 46% of all of the earthquake energy released. Fifty-five earthquakes since 1900 have been strong enough to cause damage.

April 25, 1992 was a beautiful warm Saturday. At 11:06 am, a rupture began three miles ENE of Petrolia at a depth of six miles beneath the surface. Most of our damaging earthquakes have been located offshore on strike-slip faults, where the land moves horizontally. The 1992 mainshock was different. It was on a thrust fault, a tilted ramp where the land above was shoved up and over the land beneath. This thrust faulting caused a 15-mile long stretch of the coast near the mouth of the Mattole River to rise more than four feet, killing the intertidal marine life and changing the coastline.

The same faulting that raised the coast uplifted a 40 square mile area just offshore as well, producing a tsunami. Because the uplift was relatively modest, the tsunami was as well. The Humboldt Bay tide gauge recorded an eight inch surge and Crescent City, about 100 miles away, detected 22 inches. An eyewitness thought the tsunami was about three feet high south of Trinidad.

The tsunami coincided with low tide so it caused no flooding. But it was important for several reasons. It was the first potentially damaging “near source” North Coast tsunami ever recorded. Our instrumental record began in 1933 when a tide gauge was installed in Crescent City’s harbor. Since then, 38 tsunamis have been recorded. Before 1992, they had all had been triggered by earthquakes more than 2500 miles away. The tsunami warning system for the US West Coast had been designed for these distant tsunamis, with four or more hours before the first wave arrives. This gives emergency managers time to issue warnings and coordinate evacuations. The 1992 tsunami arrived in Humboldt Bay less than a half hour after the earthquake.

On the beaches in Southern Humboldt County, the time was even less.

The earthquake produced the strongest ground shaking ever recorded in a California earthquake, registering over twice the acceleration of gravity on the nearest strong motion instrument at Cape Mendocino, strong enough to bounce a Caterpillar D-9 tractor trailer into the air and land it a foot away without leaving a track in the mud it was mired in.

The 1992 earthquake occurred at a time when only a small group of geologists and seismologists were talking about the hazards posed by the Cascadia subduction zone. Paleotsunami deposits, Native American oral history, written records from Japan and geophysical modeling all suggested earthquakes as large as magnitude 9 had occurred in the past (previous columns). But the larger earthquake hazards community knew nothing about it.

The 92 quake jolted emergency planners and earthquake professionals throughout the country. The thrust fault that produced the 1992 quake was very close to the inferred location of the Cascadia subduction zone. It was a mini-version of what researchers expected a bigger Cascadia quake to cause – thrust faulting, strong shaking, coastal deformation and a tsunami. The ground had barely stopped shaking when ramifications began to emerge.

Don Hull, head of the Oregon geology agency DOGAMI, was a friend of Senator Mark Hatfield, the chair of the Senate Appropriations Committee at the time. Don used the 92 quake to convince Hatfield that the US was woefully unprepared for a larger Cascadia tsunami. In 1994, Hatfield convened the first ever hearings to mention the Cascadia subduction zone in Congress. The hearings led to the establishment of the National Tsunami Hazard Mitigation Program. It was a modest program for the first years, funded by a \$2.3 million a year earmark, but it initiated a program of tsunami modeling in the five Pacific states, began the deployment of deep sea instruments to measure tsunamis and led to changes in tsunami warning center operations.

California’s geology agency obtained FEMA funding to compile a study of a larger Cascadia earthquake in Humboldt and Del Norte County. It was the largest earthquake they had ever studied, the first in a predominately rural area, and the first and only one to include a tsunami. The tsunami modeling was primitive by today’s standards but it opened eyes to planners and

managers that surges could arrive only minutes after an earthquake. It was the release of this scenario in 1995 that led to the creation of the Redwood Coast Tsunami Work Group (RCTWG), an organization of emergency and earthquake professionals from Del Norte, Humboldt and Mendocino County to develop messages and programs to address the Cascadia threat that continues to this day.

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