

# Times Standard

## **Not My Fault: Don't be an April Fool when it comes to Tsunamis**

Lori Dengler for the Times-Standard

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*Entering and Leaving Tsunami Zone signs like this one in Eureka's Old Town provide a visual cue at the safe areas in our largest likely tsunami, the one caused by a M9 earthquake on the Cascadia subduction zone.*

April Fool's Day means something different to me than to most people. On April 1, 1946, the United States suffered its worst tsunami disaster. It was a beautiful Monday morning in Hawaii. Families were preparing for work and school when suddenly the ocean receded, exposing much of the sea floor. Some people rushed to collect seashells, a bad decision as minutes later, seemingly out of nowhere giant surges of water began pounding the coast.

There was no tsunami warning system at the time and no way for anyone in Hawaii to realize that a magnitude 8.6 earthquake had struck Alaska's Unimak Island about four hours earlier, sending a series of surges their way. In some places the waves were nearly fifty feet high. By the time the waters had receded, the coastlines of all of the Hawaiian islands had been battered and 159 islanders were dead.

The April Fool's Day tsunami didn't just hit Hawaii. Nine-foot waves were observed in Santa Cruz, damaging waterfront structures and killing a man walking on the beach. It was recorded on the North Coast as well, just under three feet at the tide gauge in Crescent City. Ten hours after the earthquake, the waves reached France's Marquese Islands where some of the surges exceeded 30 feet, killing a mother and child. Seventeen hours after the earthquake, the tsunami reached the Juan Fernandez Islands off the coast of Chile, sinking boats in the harbor.

The tsunami still wasn't finished. Twenty-two hours and 10,000 miles away from the earthquake source, it reached Antarctica. A small hut built by the British Graham Land Expedition in 1935, was swept away by the tsunami.

The 1946 tsunami is the archetypal event that last Wednesday's Tsunami Communication Test was aimed at. A large earthquake occurs far away and there is no way to tell if it produced a tsunami without a system in place that can detect large earthquakes, analyze its tsunami potential, and alert people in harms way.

The most lasting memorial to the 1946 tsunami was establishing a tsunami warning center. It took nearly three years for what would become the Pacific Tsunami Warning Center (PTWC) on Oahu to become operational. At the time, telemetry was not available to remotely monitor seismic stations and the center had to rely on seismologists around the Pacific to read seismograms and telephone in the arrival times. This system was still in place in my graduate student days at Berkeley and I remember staff making those calls. The process took more than an hour to locate earthquakes and estimate what coastal areas were threatened.

In the 74 years since the first tsunami center was established, much has changed. After the 1964 Alaska earthquake, a second center was established in Palmer, Alaska. Now called the National Tsunami Warning Center (NTWC), it has the responsibility to issue alerts to coastal areas in the contiguous 48 states, Alaska, and Canada. On the North Coast, NTWC is where we look for guidance.

I became involved with the tsunami world in 1992. The M7.2 Cape Mendocino earthquake produced a modest tsunami and Oregon Senator Mike Hatfield held hearings to assess U.S. tsunami preparedness. The result was the National Tsunami Hazard Mitigation Program. I was one of the California representatives for the first five years.

Today's U.S. tsunami centers have real time access to seismic stations and coastal water level instruments throughout the Pacific and Atlantic and, for earthquakes centered far away,, the first bulletins get to us in five to ten minutes. A network of ocean bottom sensors can detect tsunamis, in many cases, soon after they are generated. This provides inputs to tsunami forecast models to estimate the likely peak height, refining alerts sent to coastal communities.

But none of the improved technologies are of any use if communities, can't receive messages, don't understand them, and get them to people exposed to the surges. A perfect tsunami detection system is worthless if it isn't tested and coupled with training, outreach, and education.

Last Wednesday's test looked at part of this system – what happens to an alert bulletin after it is issued by the warning center and lands at the county level. The core of the test was using real codes, not test codes, to trigger the Emergency Alert System (EAS). We've been doing it on the North Coast since 2008 and each year there are a few different twists, and we learn something new.

So how did it go? There are several pieces that define a successful test: no one got hurt or was overly frightened because they thought it a real tsunami, we found problems to work on and fix, and we got people to think about tsunamis. No civil air patrol flyovers this year because

weather conditions made low-elevation flights hazardous, but EAS, our handful of coastal sirens and county emergency notification systems were tested.

One measure of success was the absence of calls this year from people who were confused about what was going on. Another success was discovering problems in EAS radio alerts; they were garbled in Del Norte County and not transmitted at all at one Humboldt station. We still have a problem of some cell phone providers identifying, county alert messages as spam.

There's a good reason why each year uncovers different issues. Technology continues to change. Operating systems get upgraded, sometimes to the detriment to pre-existing programs. And there are always new people - dispatchers, emergency managers, and others with responsibilities in disseminating warning information who are just learning how the system works.

Too many people are still confused about warnings. "I didn't hear anything," was the common refrain on social media. Last year I wrote a column about people's siren expectations (Not My Fault 4/2/22). I won't repeat myself except to say that there are so many better ways to disseminate alert information in the 21<sup>st</sup> century.

The April 1, 1946 tsunami has the final lesson. It made clear the threat that earthquakes far away can produce tsunami surges with the capacity to damage areas thousands of miles away. But the largest waves weren't in Hawaii. The first inhabited area hit in 1946 was the Scotch Cap lighthouse on Unimak Island about 80 miles from the epicenter. Afterwards, tsunami debris was found over 120 feet above sea level.

Coast Guard staff in housing on the hill behind the lighthouse felt the earthquake, noting that it shook for a very long time. Roughly thirty minutes after the earthquake tsunami surges obliterated the lighthouse. The five people inside at the time were never found. If they had recognized that the shaking was a warning, they all could have easily reached higher ground. Natural warnings are just as important as official ones.

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